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The Aggregate Industry in Kansas City, Mo., Territory

An Analysis of Some of the Broad Economic Factors Which Are Changing the Character of the Aggregate Industry Everywhere and How Specific Economic Factors Have Already Had Enormous Influence in Kansas City

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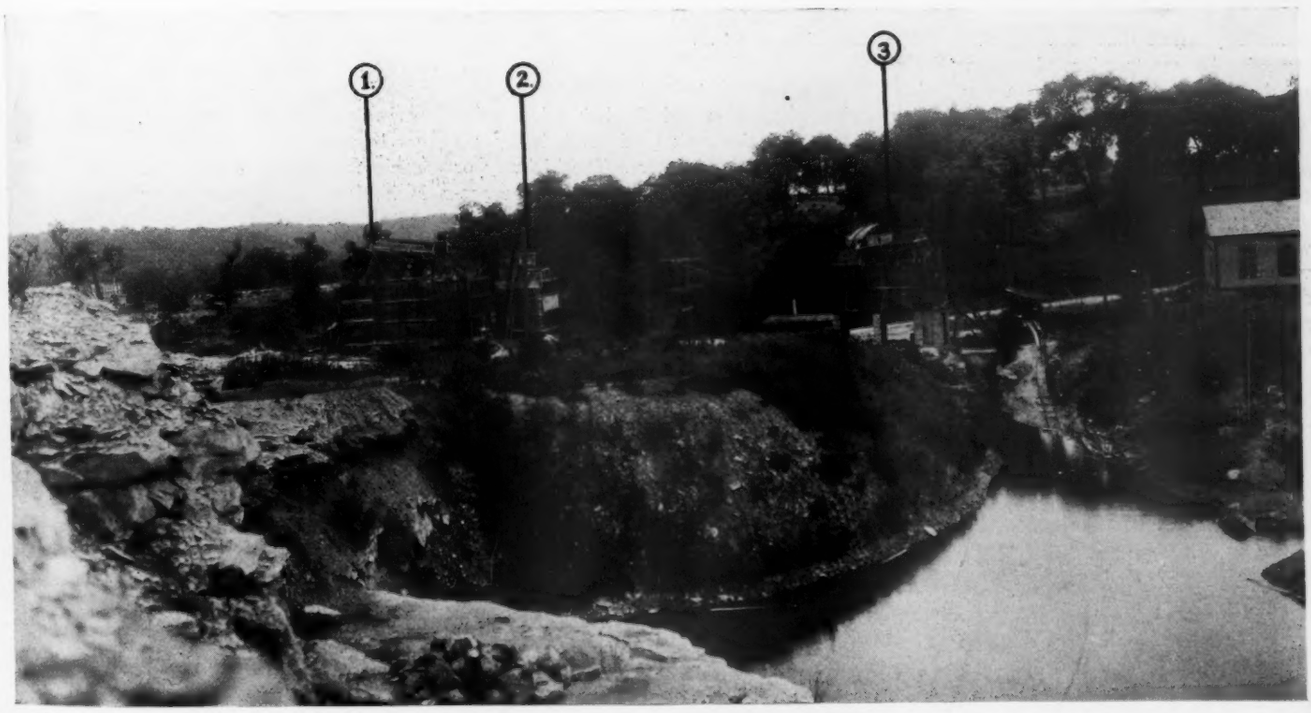
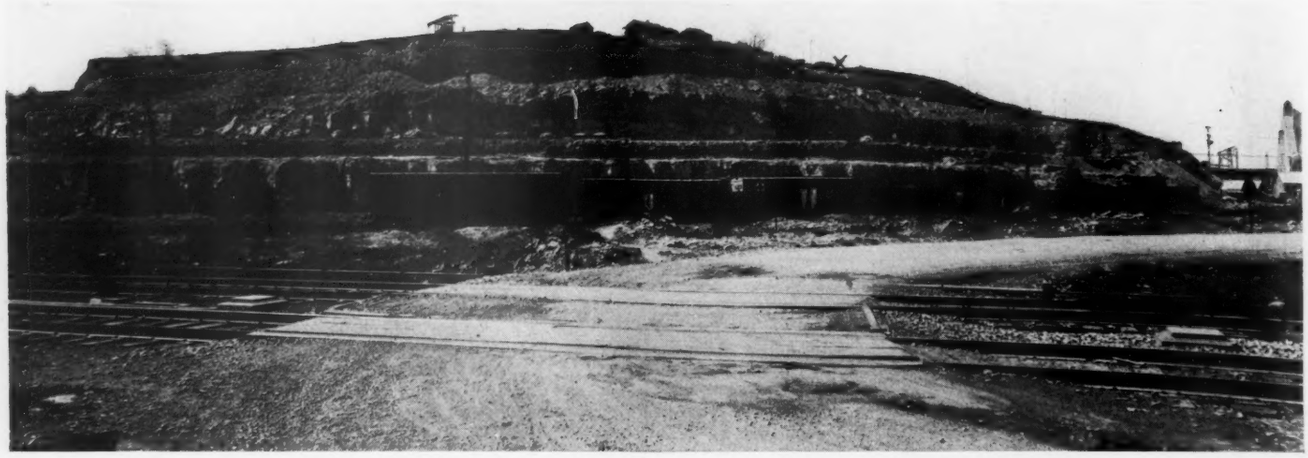


This view was taken from the quarry of an abandoned plant in the Kansas City area. Three plants are here shown, none of which is in operation. They lend eloquent testimony to the fact that to exist in the crushed stone industry today up-to-date, modern, efficient plants must be used

THIS YEAR is witnessing a very peculiar situation. In spite of the general business depression; in spite of the almost total lack of industrial and commercial building construction; in spite of the slump in the building of homes, apartments, etc., it is the writer's opinion, based on travels through 25 states, that the construction of new mineral aggregate plants will numerically exceed that of 1930. The states visited have not been the so-called industrial states, but are the South and South Atlantic states, exclusive of Texas, and the states adjacent to the Mississippi valley, as well as some of the Rocky Mountain states. I am not here discussing plants that have been practically rebuilt to increase operating efficiency or plants replaced after disastrous fires.

How can the construction of these new plants be accounted for? Who are building them? How do these new producers expect



White Rock Quarries, showing the ledges of Bethany Falls stone below and the Winterset stone above. The plant can be seen at the extreme right

to operate profitably in a field that before their entry was admittedly over-planted? These and a dozen other questions race through one's mind when the economic phase of the situation is considered.

If I were to answer the first question I would say that the depression itself is the cause of this widespread new plant construction. A low market price for a delivered commodity in which the freight tariff is often greater than the plant price of the commodity itself has contributed greatly towards the construction of comparatively small capacity plants to serve a special job or highway contract. In other words the producer has had several alternatives before him to meet the falling market: to make economics in his present operations wherever possible; to cut down overhead; to cut wages and salaries; and what is more universal and amounts to the same thing so far as the worker is concerned, to leave wage rates per hour stationary but cut the number of employes and the number of hours worked. Or to get at the heart of this subject, what is simpler than to shave a few cents per ton from the delivered cost by building a plant closer to the place of use?

Mergers have contributed a large quota to the newly constructed plants, for in many instances the newly merged companies have cut down overhead and often turned loose good men to seek new jobs. With friends, with a lifetime of experience in the aggregate industry, these men soon are promoting their own companies, and when they reach the productive stage they present competition that is often very serious. They have a feeling of resentment against the newly merged company that is costing the industry untold thousands.

Contractor as a Competitor

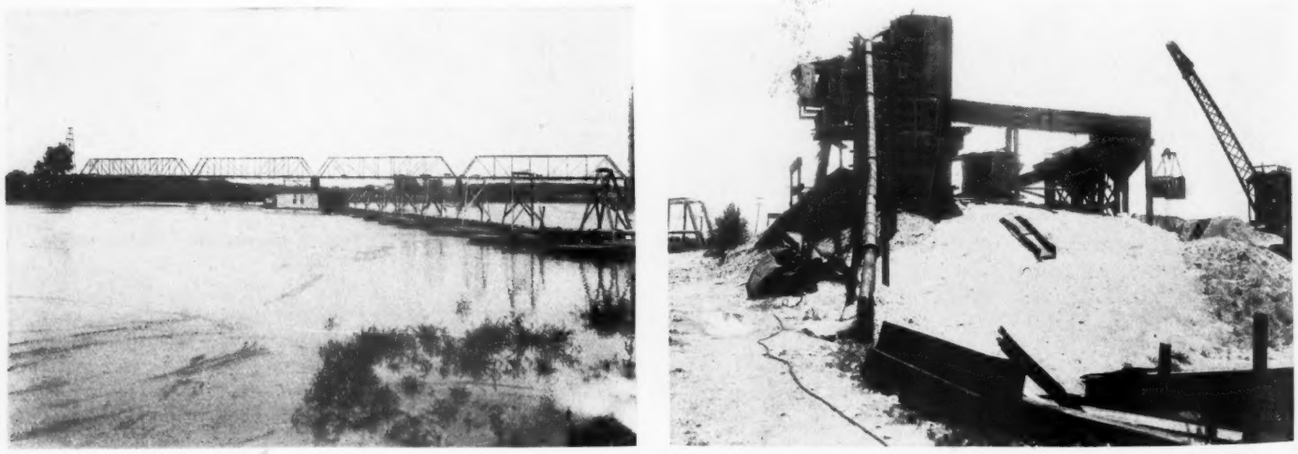
The depression and the low prices being received in the rock products industry are not confined to producers. The highway or other building contractor, owing to a superfluity of contractors in his field and the fierce competition he has to meet, is today being compelled to take jobs at very low rates. The contractor makes his living and his profits outguessing the engineers' estimates. Contracting always has been more or less of a gamble but the margin of possible profit has been sadly lowered, so that we find the road contractor looking for every possible chance to lower his construction costs. He has purchased all kinds of expensive and elaborate labor-saving machinery to cope with the falling prices received in his own line of endeavor, so his eyes turn to the production of his own aggregate as a possible source of profit.

Why not? He figures that he has been handling material all his life. Producing sand and gravel or crushed stone is handling material so why not include that as part of his contracting business? This sort of logic has contributed a large number of small plants—in most instances, ultimately to prove the contractor's undoing.

It is easily observable that this sort of new plant constructor leans towards the construction of a low first-cost plant; inefficient and costly to operate. In many cases such plants are merely a "crow's nest on stilts."

If this type of producer, or rather would-be producer, has sufficient finances he can, in time, work out of his problem by practically rebuilding his plant and putting it on an efficient basis. But by far the greater number go into this business as a last resort and the ratio of successes to bankruptcies will weigh heavily in favor of the latter after a short operating period.

Changes in freight rates, zoning of freight



Dredge and plant of the Kaw Valley Sand and Dredging Co., Kansas City, Kans.

One of the plants of the Ready Mixed Concrete Co. at Kansas City, Mo.

rates on aggregates, and the use of motor trucks have placed many old established producers at disadvantages, so that they too have had to contribute their share to the construction of new plants. Recently freight rate cases in the rock products industry throughout the middle west and even in the eastern industrial states have been undergoing changes that must and will mean the abandonment of old plants and the construction of new plants in their stead.

The dealer or broker of building material is in somewhat the same position as the contractor. His profits and income have shrunk and he looks with greedy eyes at the seeming chances of profit in the sand and gravel or crushed stone business; so he has, in many instances, launched into the production of his own aggregates. Inexperienced, in many cases, with a total lack of knowledge of the fundamentals of material handling, he is mean competition for a while, due mostly to his lack of understanding of costs; and unless extremely well financed he is the first to drop out.

Politics, or political connections too have accounted for a plant or two in the rock products industries this year. What is sweeter than to have a big politician, one who is on the inside and in the "know" to head a corporation that is dealing in a material which by the very nature of its use is hard to keep disentangled from politics?

This sort of competition lasts for a while, indefinitely at times; but when it does break, it "busts wide open," and another abandoned plant joins the collection of relics that dot the landscape.

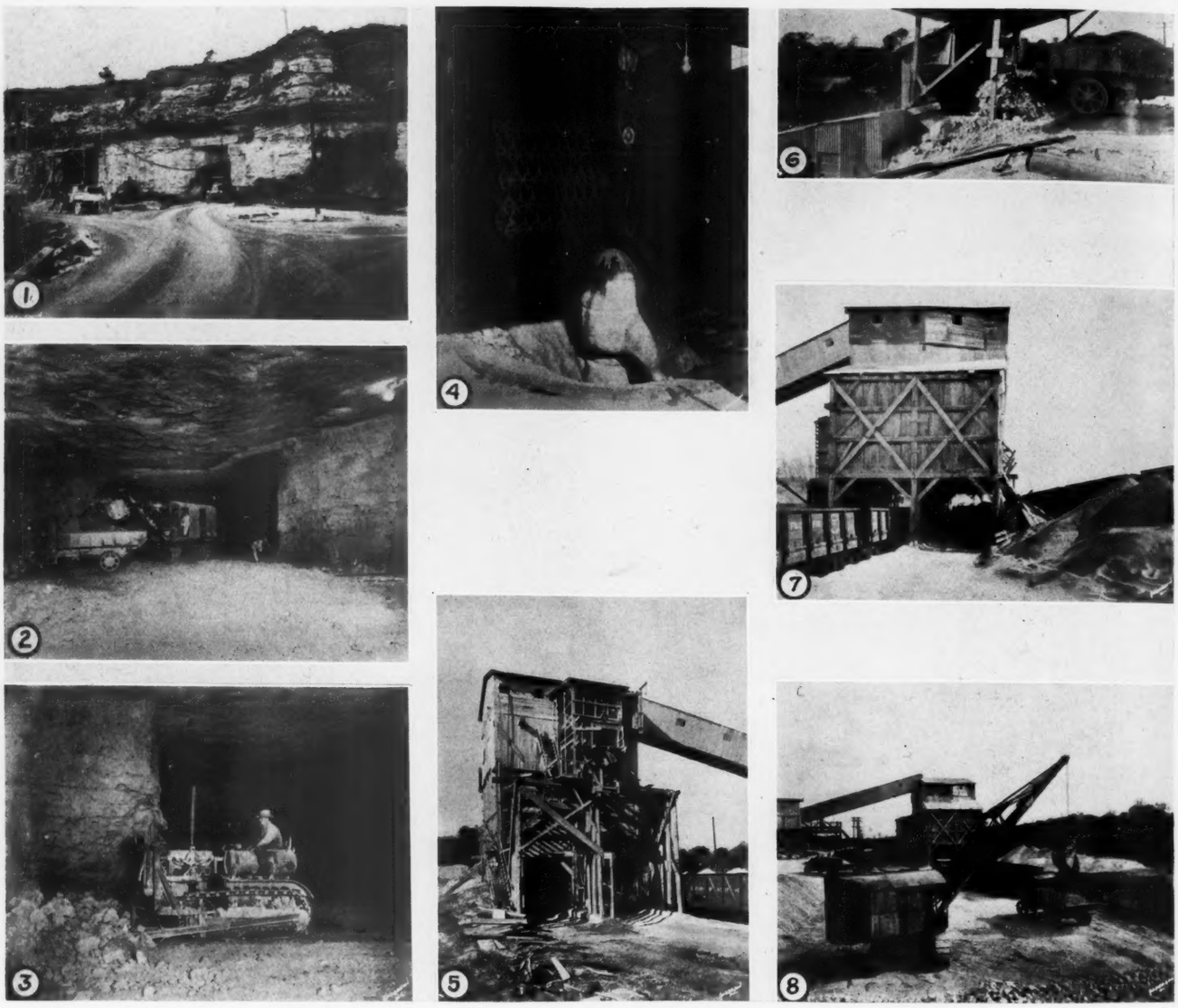
More Publicity Needed

Lack of publicity on conditions existing in any given area also indirectly may have been the cause of new plant construction. It certainly has been in the past and no doubt was a factor in this year's programs. Many times I have been told by producers: "If I had known the nature and risks, the wear and tear on machinery, the high selling costs, the amount of competition, the cost of equipment, the low prices received and the low profits possible, I never would have gone into this business." A sorely tried producer in Minnesota may think that the green pastures in Iowa are better for him, but when he learns of conditions in other states he stays put and decides that the particular locality he had in mind for another plant is not so "hot" after all.

These reasons alone might not have been responsible for a plant's construction, but at least in part they were. On the other hand, I feel that at least one new plant built in the United States this year was due to the apparent inefficiency of the competing plants. The district was obviously overplanted by a number of high cost plants, and the promoters of the new plant saw or thought they saw a chance to put in a new, fairly large capacity, modern plant and take the business. This they did, and if the company happens to be financially able to stand the resultant fight, it will either win out and cause some of the other plants to close, or compel the older producers to modernize their plants to correspond to the times.

Conditions Change—Some Producers Fail to Realize

A total lack of appreciation of the changes that are taking place in the aggregate industry is often evident. For instance, take the case of a gravel producer on a river in the central west. For years he produced a river-run product. No screening to speak of, except to eliminate some of the excess sand. At one time his pumps were all busy and operating at a profit. Changes in specifications came, washing of aggregate was required, motor-truck transportation became an important factor, and a host of other changes in industry came, but he could not see what was taking place, so today we find him complaining of hard times; and a



Views at the Pixley plant of Stewart Sand and Material Co., near Independence, Mo.

(1) Entrance to the mine. Note the overburden above the light colored or Bethany Falls limestone. (2) Loading in the mine. (3) The tractor is used to clear the mine floor of loose stone after a blast. (4) The chain feeders at the primary crusher maintain a uniform flow of stone through the plant. (5) An old view of the screening plant before the additions were built this year. (6) Dumping at the primary crusher. (7) Another view of the screening plant and bins. (8) General view of the yard and plant at Pixley

new producer with a modern plant is operating 20 hours per day, shipping aggregate to areas that he should be serving. Negligence has developed this competition.

Pixley plant of the Stewart Sand and Material Co., Kansas City, Mo. The old screening plant is at extreme rear with the loading belt and other facilities in the foreground

In the foregoing the writer has sought to draw attention to the many changing factors and conditions which are at work to realign this industry—general conditions more or less common to all producers everywhere. But there are many more things subject to change of more special or local significance. To illustrate these a special and intensive study was made of a single metropolitan territory where the results of these changing local economic conditions are easily and clearly seen. This territory is that of Kansas City, Mo.

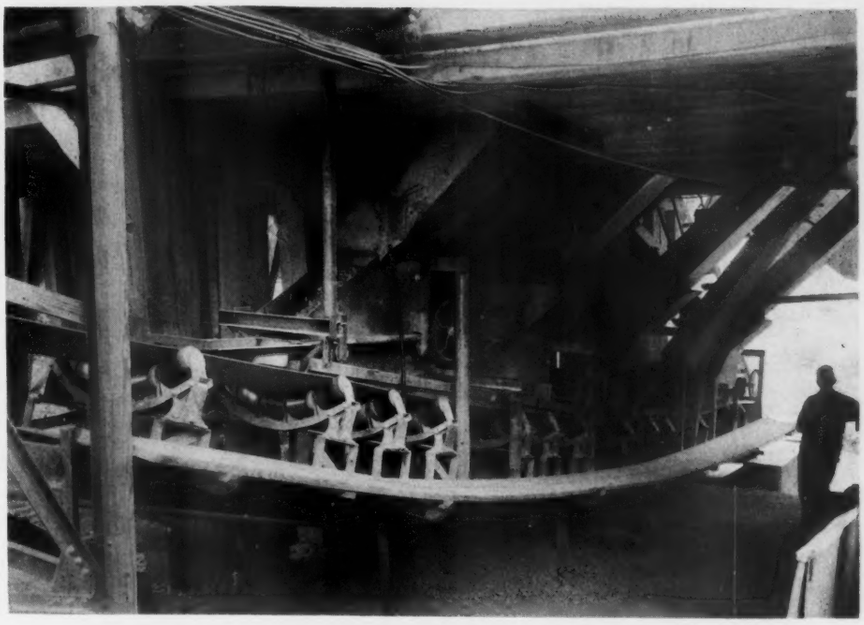
Kansas City Territory an Example

Kansas City has two separate and distinct industries, so far as aggregates are concerned: The sand industry in which the commodity moves in one direction towards the larger point of use, and the crushed stone industry where the product moves in almost the opposite direction. We might

also add here that portland cement moves in a third direction. There is no gravel industry, as the deposits in the Missouri river and Kaw river, the main sources of supply, contain practically no gravel. Hence we will have to consider these two as separate industries although several companies produce both sand and crushed stone.

Kansas City has a population of 493,000 with a normal sand consumption of around 700,000 tons per year or roughly 2000 tons per day. This may be high, I hope that it is, for the comparison that I wish to make then will be still more significant. The productive capacity of the district is in the neighborhood of 20,000 tons per day or 7,000,000 tons per year. Shipments from Kansas City producers are made in an easterly direction for about 50 miles; in a westerly direction about 10 miles, in a northerly direction 35 to 40 miles, and in a southerly direction about 200 miles. At these distances there is practically insurmountable competition with producers at St. Joseph, Glasgow, Chillicothe, Warsaw, Boonville, Jefferson City, all within the state of Missouri; at Ft. Smith, Ark.; Tulsa and Osage, Okla., and lastly but not least, at points within the state of Kansas, namely, Arkansas City, Oxford, Mulvane, Silverdale, Wichita, Topeka, Lawrence, Shokley, De Soto, Frisbie and Holliday. No doubt there are other competitive points but in a general way these localities cover the main points.

Is it any wonder then that we find dredges at Kansas City tied up at their docks, working on part time, with producing units flaring up and dying in bankruptcy? Some of these old sand plants, and the same holds true for some of the stone producing units, broke their original builders. But when they withdrew from the field, others took over the operations, only in turn further to disrupt a disrupted market, and in turn lose the invested capital. Thus in Kansas City a plant that was pointed out to me as bankrupt and not operating started on a fresh career the following day. This might continue indefinitely until the plant is worn out or taken over by an established producer.



The loading belt under the old bins, Stewart Sand and Material Co.

Why Kaw River Operators Once Had Advantage

Kaw river sand has certain natural advantages. Originally opportunities to develop dredging operations within rail shipping distances of Kansas City were comparatively limitless. Two important factors have completely changed the picture. The first is that refinements in the preparation of Missouri river sand have made it the equal or superior product. Changes in freight rates, shipping zones, and the necessity for the producer to own and operate large fleets of motor trucks for city distribution have been the other factor. Ready-mixed concrete also entered the field. Now, large efficient plants operating in the Missouri river, close to the city, are more desirable than numerous small plants on the Kaw river. The Missouri river is a comparatively permanent source of supply, because the flow is constantly replacing the material removed. The Kaw river bed can be exhausted—in many places has been.

The old screening plant remained practically as formerly, but new loading facilities were installed this year. Stewart Sand and Material Co., Kansas City, Mo.

Not only do we find many producing units on the Kaw river struggling for existence but by digging into the history of conditions we find a scrapping or abandonment of plants that is enlightening as well as astonishing. Some of the old established companies themselves had plants on the Kaw, which they found more economical to abandon, but by far the larger number of wrecks strewing the Kaw represent capital investments by would-be producers that were never (and will never be) written off. Just a plain loss of the invested capital.

It is peculiar to find new companies and new plants going into this saturated district when probably within a few miles they could see the wrecks of previous plants that have been abandoned for one reason or another. But a reason is not far to seek. It does not require a very great capital investment at present to get into the sand business in a small way in this district, but it does require ownership of sand-bearing ground that is close to the railroads for large shipment operations. Foresight on the part of the older producers has practically,

Sand classifiers on the Missouri River dredge of the Stewart Sand and Material Co.

if not completely, coralled these sites, so that what new competition has arisen is roughly 20 miles west of the city, or is confined to truck deliveries solely.

To offset this competition one old producer, the Peck-Thompson Sand and Materials Co. recently moved one of its dredges to a point within a few miles of Kansas City, and has constructed a new washing plant there, so it is able to take advantage of truck shipments readily. Farther up the river at Turner, the American Sand Co. recently built a new plant, primarily for rail shipments. This set-up, including the Muncie Sand Co. and the old Missouri river operations of the Peck-Thompson company, gives these older established producers shipping points and facilities that can parallel or better any in the district. Similarly the Stewart Sand and Material Co. has its Missouri river operations, with docks within the heart of the city and plants at Turner and Grinter, as well as several available sites close to the city on the lower Kaw river, that can be put on a productive basis by simply shifting a dredge to that location and installing the usual comparatively cheap and simple washer. Edwin Ahlskog and the Kaw Valley Sand and Dredging Co. are also producers in the area.

One of the newest producers is the Welch-Sandler Sand Co. at Frisbie, Kan., a shipping point on the Santa Fe railroad about 10 miles west of Kansas City, Mo. This company has installed a 10-in. Morse pump on a wood-hulled boat. The pump is driven by a 250-hp. electric Fairbanks-Morse motor. Three Wood "Auto Vortex" classifiers are mounted on a steel overhead frame for recovering the sand, which is chuted direct to cars. No storage bins are provided. This plant is typical of the district. It is also

A sand plant abandoned. Owned by an established producer who found that he, to live, must meet changing conditions

reported that the Consumers Sand Co. of Topeka, is moving one of its units into this area, so that withal we find producers and yet more producers; and in a restricted and highly competitive market there can be but one outcome, the strong ones will "eat" the weaker ones, plants will be abandoned, new plants probably constructed only to again fall by the wayside until the contractor, the material dealer, the optimist and what not, find that pumping sand, obviously a simple operation, is not such a simple thing after all, if the life of the operation depends on selling at a profit what is pumped.

Improvements in Preparing Missouri River Sand Change the Picture

Producion of sand on the Missouri river at Kansas City requires a far greater amount of invested capital than on the Kaw river. The dredges are more rugged to withstand the swifter current. Tow boats and barges as well as dock and unloading facilities are essential, Again the sands of the Missouri river require a far greater initial expense for equipment to produce a satisfactory and marketable product than do the sands on the upper reaches of the Kaw river, for on the Missouri river, lignite, river debris, silt, etc., have to be eliminated. This is done only by expensive initial investment and this has prevented "fly-by-night" producers from entering the field.

On the Kaw river it is different. Where the Kaw river empties into the Missouri river and for a distance of approximately 15 miles up the Kaw river there is a certain amount of back wash that prevents the use of sand taken from the Kaw, but as one goes farther and farther up the river a better grade of sand is encountered. To meet the more rigid specifications, it is necessary to go considerable distance up the Kaw, un-

And another abandoned investment

less an elaborate plant is installed. For local business, however, where specifications are not so strict, the dead line is about at 21st and Kansas Avenue, at Kansas City, Kan., and even here the material is taken only for local use.

It is this sand, however, that is trucked into Kansas City, Mo., for many non-specification jobs. It is recovered in very cheaply constructed plants and this local demand has been an invitation to the uninitiated to go into the sand business. A short distance farther up the river the sand becomes much cleaner and in fact is one of the best commercial sands in America. But this fact does not add to the amount of invested capital necessary to get into the sand business. On the contrary it tends to lessen this investment, which in turn is a further bid for more plants when prices *appear* to be high. Distance from the market and the availability of railroad shipping points are two of the factors that might tend to keep out any but the inexperienced.

So here is a case of good natural sand, easily and cheaply recovered, competing with a sand, the recovery of which requires a large investment in plant and equipment. Obviously many changing factors may revolutionize the industry locally. Increasing freight rates, improved equipment for cleaning and grading the poorer natural sand, larger operations working on the poorer sand, all tend to depreciate the advantages of the good natural sand farther from the market.

The Evolution of the Crushed Stone Industry

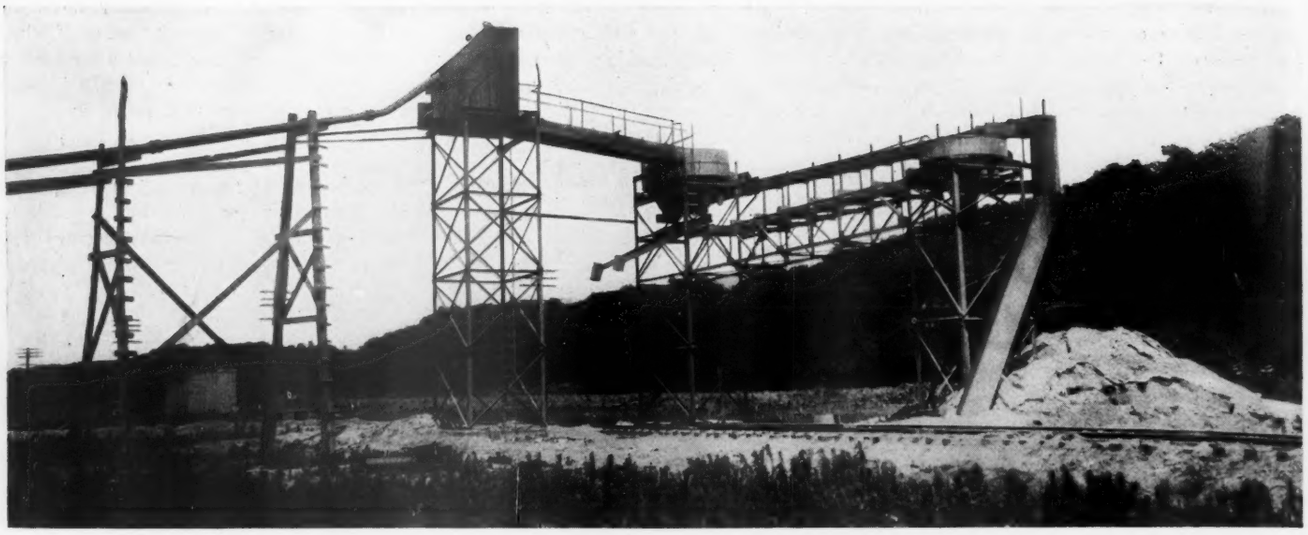
In the crushed stone industry of Kansas City we find an equally interesting history, and a history from which every present-day producer of any commodity can learn a few lessons. The reason for failures in this industry are not hard to find either. They were simple but real reasons, and lack of appreciation of these caused disaster to many concerns.

At one time, not a great many years back, there were 48 crushed stone plants in operation at the same time in the Kansas City territory. There are at least a hundred sites in the district that once had a crushed stone plant. Many of these plants have disappeared entirely, having been gradually removed, piece by piece, until only a scar on a hillside shows where there was once a quarry; and even some of the old quarry sites are so overgrown with weeds and underbrush that it is difficult to find them. Not all of the old plants have been removed entirely, for I located some 20, many of which were even too far gone to get a photograph of. Nevertheless enough remained of a dozen plants or more to illustrate amply the trend of events that led up to the junking of so many plants.

To understand the crushed stone industry of Kansas City one must first picture the character of the surrounding country and the topography of the city itself. Kansas City is not a flat area, but is made up of a series of rolling hills bisected and cut up by innumerable gulleys or washes running at all angles, so that each hill is more of a dome-like structure than part of a continuous range. The illustration showing the hill from which the White Rock quarries is at present getting stone is typical of the district. Many of the deposits were not so symmetrical as the one shown; I say "were not so symmetrical" for most of the deposits close to the city are now non-existent; they have been worked out.

In these hills (we will take the White Rock quarries as an example) the bottom layer of stone is a white to gray limestone, locally called the Bethany Falls limestone. This stone is the source of the best aggregate that the district produces and is the

The changing picture of the industry has caused dozens of plants, once active, to fall into decay



New plant of the Welch-Sandler Sand Co. at Frisbie, Kans., about 20 miles west of Kansas City, Kans.

only stone that is acceptable to the state highway commission. The lower part of the Bethany Falls limestone is an excellent grade of stone when compared to that of some other more distant localities, but the upper few feet of the deposit weathers rapidly when exposed to the air, and it is to the producers' advantage to keep this stone out of his aggregate when possible.

Where the Bethany Falls limestone is overlaid with a thick bed of overburden, which practically is the case in all the producing quarries and mines, the stone easily meets specifications. But one producer many years ago built a plant for a deposit that was not covered with so much overburden and after his plant was done he found to his amazement that his stone did not meet specifications, because nature had so badly weathered the unprotected stone that it was unfit for use. That accounted for one of the many quarry failures in the Kansas City district.

The limestone in the Bethany Falls ledges lies practically in a horizontal sheet, with the outcroppings more or less exposed at the outer fringes of the hills. On top of the Bethany Falls limestone usually are a few layers of clay, shale or dirty material, on top of which, in turn, are the Iola and Winterset limestones. On top of the Winterset stone are from a few feet to a dozen feet of layers of shale, shaley limestone and soil (Loas).

Small Operators Have Their Inning

The outcroppings of the Bethany limestone were the ones that the earlier producers tackled. Their plants for the most part were small, ranging from 200 to 500 tons per day of ten hours, and when the operations were in their infancy showed a low operating cost, for stripping was not a factor. As the overburden became heavier costs mounted to a prohibitive degree, and this is the second reason in accounting for the wrecks that strew the hillsides of Kansas City.

Some operators attempted to strip the overburden and reclaim the top stone (Iola) because it was satisfactory for local uses while not ordinarily acceptable for the state highway work. As the overburden became heavier and heavier the producers naturally turned to mining, especially from the Bethany Falls ledges. But a mining operation imposes conditions different, both from an operating and commercial standpoint, than a small quarry. A limestone mine to be profitable must have tonnage, and tonnage requires a much greater investment in plant and equipment than the small quarry operators were accustomed to. Mining, to be efficient, is better done in one large operation than in several small ones.

Mining of Stone Completely Changes the Picture

The Bethany Falls deposit is only 15 to 22 ft. in thickness, and to mine it by the room and pillar system from tunnels it is necessary to leave at least 4 to 6 ft. of stone for the roof and to leave pillars at frequent intervals to support the roof. In other words, mining cuts down the reclaim-

Feeders for delivering the finer size to reclaiming belt at the Frisbie plant

Pump on dredge of Welch-Sandler Sand Co.

able stone from an acre of ground to roughly one-half of that which could be removed by the open quarry method. From an acre of ground with a 20-ft. ledge it would be possible to recover roughly 60,000 tons, but by leaving a roof of 5 ft. of stone and suitable pillars, the amount of stone per acre recovered would be cut to about 30,000 tons per acre. This in itself would not have been so serious in many cases if there had been plenty of acres available. As many of the deposits were much less than 40 acres in extent their life was short. Coupled with this fact was the high cost operation so far as drilling, mining, transportation and crushing were concerned, so that it is doubtful if a given plant producing and selling a million tons of stone showed profits sufficient to write off the original investment. This was another contributary cause to the destruction of many of Kansas City's crushed stone enterprises.

Not only does mining the stone cut down the amount of available material but it is to be recalled that an operation such as that at Pixley of the Stewart Sand and Material Co. will mine out in the neighborhood of 10 to 15 acres per year. To have a low operating cost requires a well-built plant with a reasonably high daily capacity, and the mine must be equipped with the latest of labor-saving equipment. This requires a large investment and, as pointed out before, there are few if any deposits left that have enough tonnage of Bethany Falls stone available to justify such an outlay.

Where such an acreage is mined each year the face of stone recedes rapidly from the crushing plant, so that each year the stone must be hauled a greater and greater distance. The use of large capacity motor trucks in the mines has helped to solve this problem. Trucks up to 15 tons' capacity are being used in this district.

Dredge of the Welch-Sandler Sand Co. at Frisbie, Kans.

Advantages and Disadvantages of Mining Stone

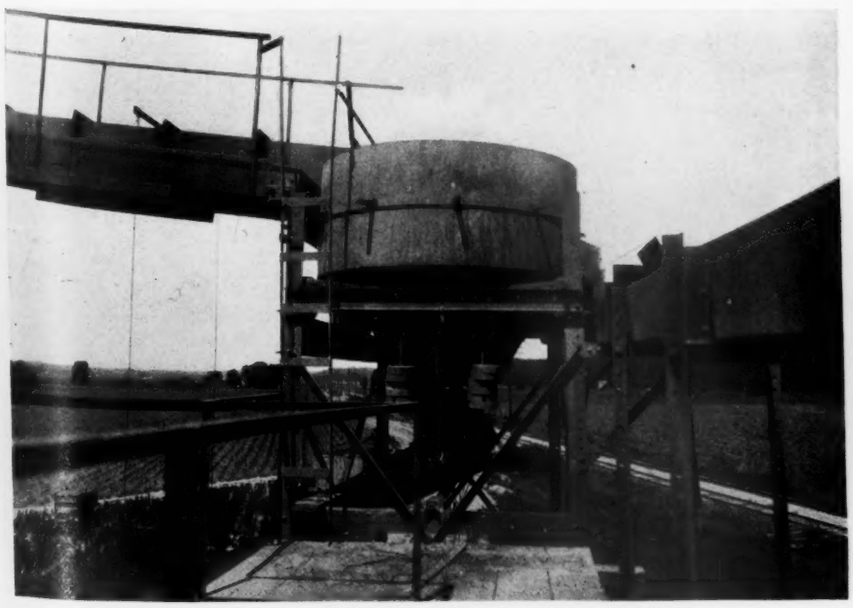
In mining stone at Kansas City the rooms are roughly 18 ft. high. A top slice is first made into the breast, just high enough for the men to work. After the top slice is completed the lower bench is shot with "lifters." All of this work is done with drills of small diameter. As the ground is tight, in many cases, an excessive amount of powder has to be used, resulting in the production of a high percentage of fines. Even where the stone has been splattered up against a roof-supporting pillar from a shot there can be found a considerable accumulation of fine stone.

The fine breakage of stone in the mine, however, requires a much smaller primary crusher for a plant of given capacity. A No. 8 gyratory is about the largest primary crusher in the district, and when fed to its maximum capacity with this small stone it is capable of a large daily output. At the Pixley plant a Ross chain feeder has been installed at the primary crusher to balance or level off the flow of stone through the plant, so that not only is the primary crusher fed evenly and at a maximum capacity, but the flow of stone throughout the entire plant is evened up and stone surges eliminated without recourse to surge bins which would have required extensive plant reconstruction. This has assisted greatly in the proper screening of the stone as well.

The advantages of mining stone are several: climatic conditions are always under control, and where the stone is not washed, as in the Kansas City areas, a dry product from the quarry is almost essential; hence it is possible to produce a dry stone at all times, thereby insuring a clean stone at all times. Again, the extreme heat of the summer and the cold of the winter days do not have any tendency to lower the daily output of the mine.

Improved Methods Are Important Factor

The use of trucks in a mine of this type is in itself no novelty, for several limestone mine operators are using trucks. Those who have changed to this form of transportation in the mine have considered the effect on the men of the exhaust gases rising from the trucks. At the Pixley mine four Mack trucks are in service and are hauling stone a distance of roughly 1500 ft. within the mine itself. The trucks have 9 tons per load.



Classifiers at the new plant of Welch-Sandler Sand Co.

Two dredges on the Kaw river about six miles from the center of Kansas City, Mo.

The exhaust gases are passed through a water filter that is part of the truck's equipment, and from this filter the gases pass through an exhaust pipe that has been pointed upwards and to a point well above the operators' heads. Also 6-in. churn drill holes have been put down from the surface at frequent intervals to which have been attached small exhaust fans, so that the light exhaust gases are swept from the mine. No odor of gasoline or partly burned oil is noticeable in this mine, and frequent analyses of the air in the mine show insignificant amounts of carbon monoxde.

The lessons learned in the change from open quarrying to mining of stone were extremely costly to the industry and only those companies which were well financed were able to weather the years. Perhaps the greatest contributor to the success of underground production of stone in the district was the introduction of power shovels with a short boom capable of working economically in confined spaces, and the introduction of truck and tractor transportation. Only operators who were financially able to install such equipment and to concentrate their activities were able to survive.

The Crushed Stone Market

The total market of crushed stone in the Kansas City territory runs in the neighborhood of from 1,150,000 to 1,900,000 tons per annum, according to authentic figures. Of this the Missouri Portland Cement Co. is said to account for 300,000 to 400,000 tons per year; the Centropolis Crusher Co. and its subsidiary, the Ready Mixed Concrete Co., for around 200,000 tons per year, the Deitz Hill developments (White Rock Quarries) 150,000 tons, leaving a market estimated from 400,000 to 700,000 tons per year for the plants of the former Consumers Materials Corp., now operated under lease by the Stewart Sand and Material Corp., and a few small retail establishments. In the retail markets the Ready Mixed Concrete Co. accounted for 150,000 to 240,000 tons per year out of a total of 350,000 to 400,000 tons per year.

Demand for Better Stone Another Important Factor

As in the case of sand, demand for a better prepared product has had an important bearing on survival in the crushed stone industry. Years ago in Kansas City it was possible to simply crush the stone, screen it and drop the material into a bin or bins from which the product was drawn direct to cars or trucks. Demand for a graded product has changed this picture completely, so that we find that it is necessary to install special equipment. This is simple enough, but where the relationship between tonnage available and the invested capital is such a vital factor, this kind of an installation only tends to increase the disadvantages of the small operator. Few deposits and plants can afford to make this added expenditure.

As an illustration take the Pixley plant of the Stewart Sand and Material Co. Here un-

Plant and dredge of the Muncie Sand Co. on the Kaw river

At one time this sand and gravel plant may or may not have been profitable, but changing conditions removed its usefulness and only the foundation remains

der the old bins was installed a 36-in. Goodyear belt conveyor, fed by four gates that are patterned after those used by the New York Trap Rock Corp. These gates feed the coarser aggregates in predetermined amounts by a simple setting of each gate. The finer aggregates are fed by two Hardinge feeders. This belt delivers to a Robins vibrating screen that acts as a final cleaner, after which the product is chuted to cars or can be passed to another set of bins for truck loading. This structure is all constructed of steel and no doubt represents a cost as great as the entire screening plant.

This feature of the operation is only the start of an extensive program which will require practically the rebuilding of the entire screening plant and the erection of several silos for storage. I am pointing this out here to show that to keep in the swim not only must a plant, to retain its markets, keep up with the times, but it must have sufficient funds available at all times so that when a change in conditions is apparent the operator can fall in line. The failure to observe this requirement accounted for some more of the wrecks in Kansas City.

The industry is not stationary by any means. Each year the operator who wishes to retain his leadership will have to expend considerable amounts of money. Already the operators are discussing the washing of stone and the possibilities of reclaiming some of the easily weathered roof material which is now wasted.

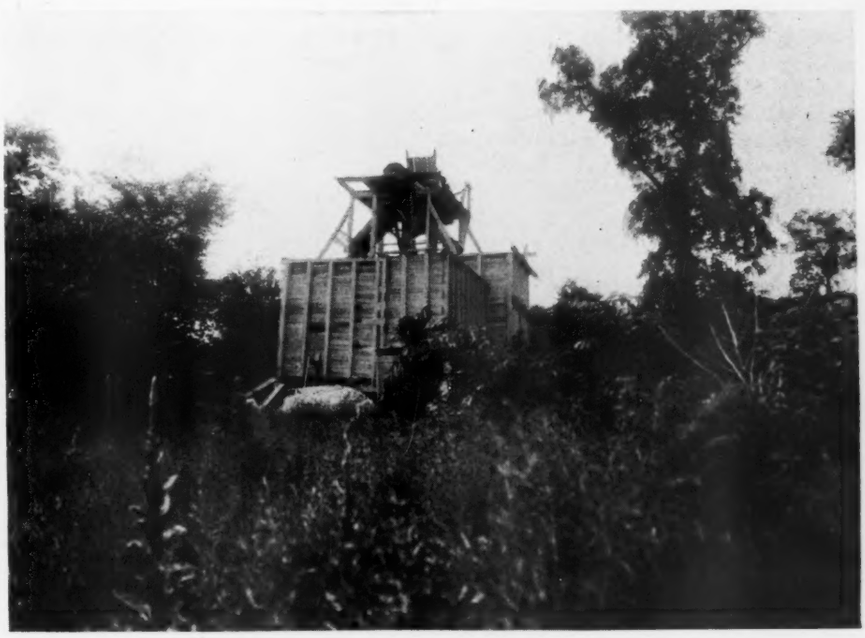
Operated yesterday; not operated today. Probably again in operation by the time this is published. Thus these plants pass through one or more cycles of life before they must ultimately be scrapped

To Find a Method of Preparing Poorer Stone

It has been proposed to build open stock piles capable of holding 50,000 tons of sized stone or more. This pile would be allowed to lie out in the open all winter, which would be sufficient time for the inferior particles to disintegrate. Then by a selective and systematic removal of material from the stock pile and passing the stone over a final screen before loading it would be possible to use more of this class of stone. But here again this might entail a capital investment that would be unwarranted unless the extent of the deposit was considerable.

No stone in this district is washed at present, mainly for the reason that water is scarce and disposal of the debris might be a problem, but the washing of stone in Kansas City as well as elsewhere is a possibility, perhaps a probability, and when one producer starts it they all will have to follow suit regardless of the inconveniences.

The fact that there are several hills within the city itself that are underlaid with limestone has led to the projection of realty development companies which propose to remove the limestone and to use the strippings for fill-in material in some place adjacent to the project. After the hill has been leveled off the subsequent increase in realty values is one of the alleged sources of profit. The White Rock Quarries, op-



Weeds and other vegetation soon hide the plants

New plant of the Peck Thompson Sand and Materials Co., near Kansas City, Kans.

erated by the Deitz Hill Development Co., is carrying out such a program and is reclaiming the Winterset stone for aggregate for local uses and the Bethany Falls stone for the more exacting requirements. Mining of the Bethany Falls stone as well as open quarrying is being practiced at this operation.

The Missouri Portland Cement Co. is said to have expended some $200,000 on a crushed stone plant in 1927. It is favorably located as regards freight rates and has favorable mining costs incidental to the use of some of the stone for the manufacture of portland cement. It is an important factor in the crushed stone industry because of these advantages.

Another fairly large producer, who is in a favorable position especially in the retail market, is the Centropolis Crusher Co., whose plant and mine are close to the city proper. Rock Products published a description of this plant at the time it was built. Operations have been very successful since that time and it has been able to take advantage of lower operating costs by adding the latest in equipment. Only last year a 4-ft. Symons cone crusher was installed that has been a big factor in reducing the amount of fines and in lowering operating costs. This company is a subsidiary of the Ready Mixed Concrete Co.

Factors Entering Success of Stone Operation

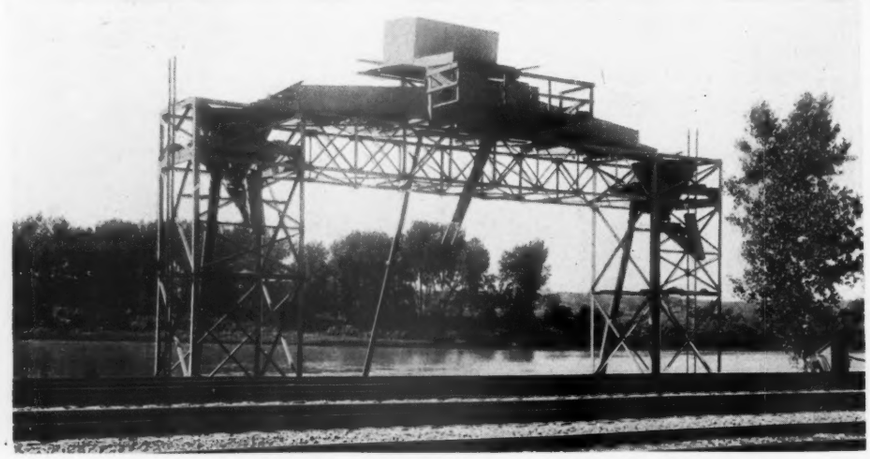
A crushed stone operation to have any chances for success in this field must first of all have a deposit of Bethany limestone of sufficient area and thickness to justify the erection of a modern plant. It is no piker's game by any means for acreage must be purchased, $175,000 to $250,000 expended on a modern plant, and to write off an investment of a quarter of a million dollars would require 2,500,000 tons of recoverable limestone at 10c. per ton. Possibly with one exception there is no such acreage or ground available that is not being mined today.

Further, the deposit must be within a short distance of the city proper. As the railroads are perhaps the largest users of stone the deposit would have to be served by as many railroads as possible; and the ground cannot be too close to the city for then the first cost would be prohibitive. These few conditions while simple in themselves are such that Kansas City is not now a fruitful field for the small scale stone producer as it has been in the past.

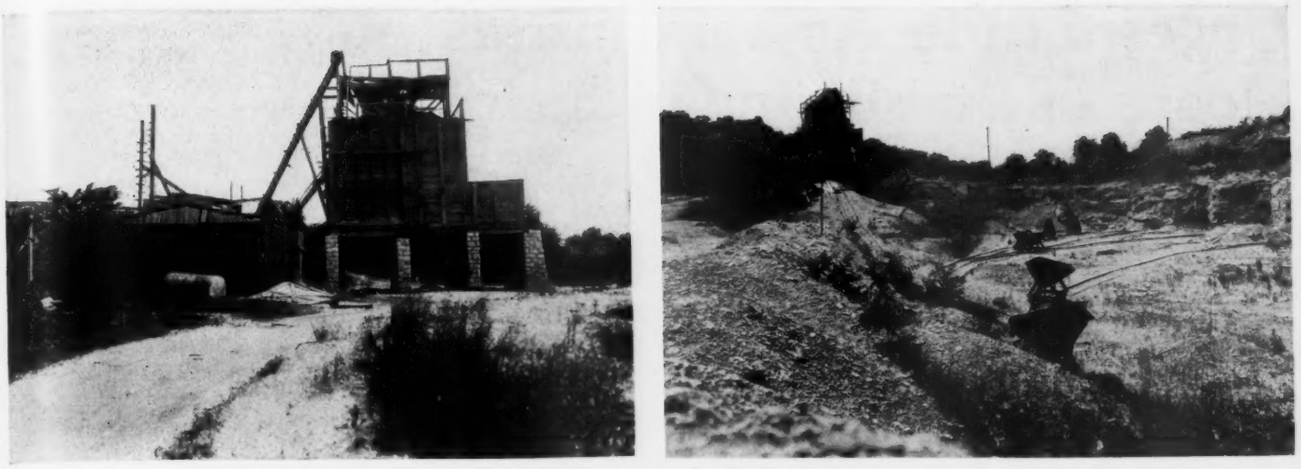
The companies mentioned so far have been those of fairly large capacity and are in a position to take care of both the wholesale and retail markets. In addition to these there are several companies on the outskirts of the city which have small plants that are largely retail trucking establishments. Among these might be mentioned Boyns Rock Crusher at 34th and Bell Crossing; the Frank Flinn Construction Co. at 85th and McGee; Halpin Dwyer Construction Co. at 32 and Raytown road; H. J. Nicholas Crusher Co. at 33rd and Wyoming and the Rainbow Quarries Co. at 3700 Rainbow boulevard.

The effect of ready-mixed concrete upon the aggregate industry in this district is worthy of comment. To make ready mixed concrete and deliver it on the job three separate and distinct hauls on aggregate are necessary: (1) the sand must move in one

Dredge of the Peck Thompson Sand and Materials Co.



New plant of the American Sand Co. at Turner, Kans.



Two abandoned plants

direction; (2) the coarse aggregate must move toward and meet the sand; (3) the ready mixed concrete must be delivered to the job. The contractor who mixes his own concrete only has to have two hauls, namely the sand in one direction and the crushed stone in the other, so that it would appear that from a strictly economic standpoint ready mixed concrete in Kansas City would not be a practical business. Yet we find that there was sold within the city in 1929 in the neighborhood of 150,000 to 160,000 cu. yd. of ready mixed concrete at prices that, taking everything into consideration, were well above prices in other cities.

General view of the Centropolis Crusher Co.'s plant at Kansas City, Mo.

Stake Limestone Claims in Alaska

FOUR CLAIMS of limestone rock were recently staked out in the deposit which occurs at the water's edge in a mountain towering above the Stikine river bank, 12 miles from Wrangell, Alaska, says the *Sentinel.*

A. Vreatt did the staking and his four claims have an aggregate frontage of 2400 ft. and extend back 1500 ft. Government analysis shows the limestone to be 97% calcium carbonate.

An engineer representing large chemical interests will be in Wrangell soon for an examination. The company stated that the deposit was the highest in purity of any analysis ever made in their laboratories.—*Seward* (Alaska) *Daily Gateway.*

Dredge of the De Soto Kaw River Sand Co. at De Soto, Kans.

Wisconsin Geologists Study Gravel Supply

GEOLOGISTS from Madison, Wis., are making a survey of the gravel deposits in the territory about Pine River. They are primarily interested in finding suitable gravel for concrete work, in large enough quantity to use in the completion of highway, between Fremont and Weyauwega.

It is stated they have already found some very promising deposits. Upon the completion of this survey the state department will have records to show where the road building materials are to be found and quantity there.—*Oshkosh* (Wis.) *News Weekly.*

Producer Plans New Operation

NEGOTIATIONS are under way for the purchase of the Frank Gaskill farm in South Hopedale, Mass., by A. Rosenfeld and Sons. It is the intention of the new owners to equip the place as a sand and gravel plant and also install a crusher for trap rock.

It is estimated that an outlay of about $25,000 will be necessary to properly equip the place for this purpose. Men will erect 400-ton bins to house the materials.

The present Rosenfeld sand and gravel pit will be abandoned when the Gaskill farm has been secured and changed over.

The new plant will be operated by the Rosenfeld Sand and Gravel Co.—*Milford* (Mass.) *News.*

Urges Trade Association as Means of Stabilizing Industry

Group Control of Production and Coextensive Employe Insurance Proposed by Gerard Swope

A NEW CONSTITUTION for industry intended to provide lasting relief from hard times was proposed by Gerard Swope, president. General Electric Co., at the annual dinner of the National Electrical Manufacturers Association in New York on September 16. His plan, which has been worked out in detail, contemplates the stabilizing, first, of production and consumption, and, second, of employment.

In introducing his program Mr. Swope said: "Industry exists basically for serving the needs of the people, and therefore production and consumption must be coordinated. Consumption is by the mass of the population, not the few, and the great mass of the population is made up of wage earners and their dependents. That they may be able to buy and satisfy their needs, they must have not only adequate incomes but must be sufficiently assured of the future to feel that they are safe in spending their money. The psychology of fear must be removed, and this cannot be done unless they have reasonable expectation of protection for their families in case of the breadwinner's death, protection for their old age, and protection against unemployment. By 'protection' I do not mean a protection that is given them but I mean protection that they themselves help to provide."

Control of Production

Each industry, under Mr. Swope's plan, would establish a trade association to be under the supervision of the Federal Trade Commission, or a bureau of the Department of Commerce, or some federal supervisory body specially constituted.

These associations would "outline trade practices, business ethics, methods of standard accounting and cost practice"; they would collect and distribute information on volume of business, inventories of merchandise on hand, standardization of products, stabilization of prices, "and all matters which may arise from time to time relating to the growth and development of industry and commerce, in order to promote stabilization of employment and give the best service to the public."

Of outstanding importance in the Swope plan is the function of the trade association as the instrument through which industry would exercise control of production. The practices devised and administered by the association in the interest of stabilization would be submitted to the federal supervisory body, by which their soundness as a social principle would be tested, and to which the public might resort to raise objection.

Companies of an industrial or commercial character having 50 or more employes and doing an interstate business would come within the plan, to which they would be required to adhere within three years, unless the time should be extended by the federal supervisory body.

Protection of Employes

For the protection of their employes the participating companies must adopt employe plans providing for workmen's compensation, life and disability insurance, pensions, and unemployment insurance. If a worker, for some good reason, should leave his original employer and go into the service of another concern, he would not thereby forfeit his pension, his insurance, his unemployment insurance contributions, or his status under workmen's compensation. This safeguard, Mr. Swope held, would promote the security of the workers and materially aid in stabilization of employment.

The pension provision includes contributions by employes to a minimum of 1% and approximately equal contributions by the company. The unemployment insurance plan would involve equal contributions by the company and the employe, and payments in times of lay-off amounting to 50% of average full-time earnings up to a maximum of $20 per week. The principle of joint participation and joint administration by management and men in these several employe plans is to be followed.

In addition a general board of administration would be formed by each trade association, this board to have nine members representing the trade association, the employes of the member companies, and the public. The general board of administration would constitute a body of overseers. Its duties, as laid down by the proposed plan, would be to interpret the various employe plans, supervise the individual boards of administration of the various companies, form and direct a pension trust for the custody, investment and distribution of pension funds, and in general direct all activities connected with the employe plans.

"The foregoing plan," said Mr. Swope, "tends to put all domestic corporations of the class described on a parity for domestic business, thereby removing the inequalities of the different laws in the several states, provides for standard forms of financial reports and their periodical issuance for the information of stockholders, and places on organized industry the obligation of coordinating production and consumption and of a higher degree of stabilization.

"This will tend to assure more uniform and continuous employment for the worker and the removal of fear from his mind, allowing him to devote himself wholeheartedly to his task. The cost of the product will include these items and will therefore be paid by the users of the article or service, and not in general by members of the community who are reached by the vicarious methods of the imposition of a tax."

Editor's Comment

ABSTRACTS of Mr. Swope's plan have been published in nearly all the daily newspapers; but in spite of that we believe the subject of such vital importance as to justify reprinting here (the original of this abstract was published in "Iron Age"). If the Rock Products reader has already read it, he might do well to re-read it here.

The point is that industry has passed the stage where it is possible to discuss merely the desirability of industrial stabilization and all its related problems. Whether industrialists and producers believe in it or not is not the point at issue. It is certain we shall have attempts made to bring about employe insurance against sickness and loss of work.

Consequently, it should be clear to every industrialist that it is far better for industry to work out its own solution than to have matters bungled by politicians and theorists.

We suggest that at the coming conventions of the trade associations in the rock products industry Mr. Swope's plan be studied and discussed and some action taken.

—The Editor.

To Build Sodium Sulphate Plant in Washington

IMMEDIATE ERECTION of a 100-ton sodium sulphate plant at Monse, in Okanogan county, Wash., as part of a million dollar pulp and paper mill project for Priest River, Ida., was predicted in an article appearing in the *Spokane Chronicle* recently.

According to the *Chronicle*, R. R. Black has arrived in Spokane to supervise construction. C. W. Beardmore, company official, will arrive at Priest River from New York in about two weeks. Mr. Black is quoted as saying, "He will be the one to give out details regarding our construction program."

Development plans call for construction of a 100-ton kraft pulp mill at Priest River, and a 100-ton salt cake plant near Monse. The development is expected to be made in a unit system.—*Wenatchee* (Wash.) *World.*

Economics of the Nonmetallic Mineral Industries*

Part VIII—Sales Methods

By Raymond B. Ladoo

Manager of the Industrial Commodities Department, United States Gypsum Co.

Abstract

THOSE PROBLEMS which must be considered and answered in setting up the sales policy, or in determining selling methods, are herewith presented as they may concern producers, or those contemplating the production, of nonmetallic minerals. The various selling agencies are discussed. Specialty selling is explained. And of particular interest is the presentation of industrial selling of these products.—The Editors.

UPON THE METHOD OF SALES used depends to a considerable degree the effectiveness of sales efforts and the volume of sales. Each industry and each company in an industry has its own peculiar conditions which require special treatment so that no general method can be worked out which will apply to all companies.

The method of sale best adapted to any company's needs depends upon many factors, such as type of product or products made, number of different products made, classes of customers, competitive sales methods and policies, value of commodity to be sold, margin of profit, annual volume of business, where product is to be sold (within small radius of plant or nation-wide), in congested city areas or in sparsely settled country districts, and whether or not the product is effectively advertised, or can be.

Obviously the same type of salesman and the same methods of sale would not be used to sell agricultural limestone to farmers, diatomaceous earth to sugar refiners and portland cement to building material dealers and highway contractors.

If a company makes a single product or a small group of closely allied products which are bought by a few similar classes of trade within a small geographical radius the sales organization problem is a comparatively simple one. But when a company produces a great number and variety of materials which go to many and widely varied classes of trade scattered over wide areas, even over the whole country, the problem becomes exceedingly complex and difficult.

Determining Sales Policy

Products may be sold by a company's own salesmen, by jobbers, or by sales agents; they may be sold direct to consumers, to dealers, or to industries which use the products as raw materials or who may resell along with their own materials in mixed car shipments. If a company sells only through its own salesmen and has a wide variety of products to sell, questions to be answered in determining the sales policy are: should each salesman handle the full line; should the commodities be split up into groups and have specialty salesmen to handle each group separately; or should a combination of the two methods be used?

Jobbers

Jobbers have a legitimate place in the sale of many mineral materials. They usually handle a great many minerals and chemicals and are in close touch with many different types of industry. They have warehouses in the principal industrial centers and can make quick deliveries by truck or less than carload quantities of materials.

Many companies producing moderate priced bulk materials such as feldspar, talc, mineral colors, etc., have found that it does not pay them to handle less than carload business. The cost of handling an order for a few bags or barrels or tons and the amount of time consumed in finding and selling small customers is all out of proportion to the amount of the returns.

One important company in this class revised its accounting system so as to show the true costs of its l.c.l. sales. To their great surprise they found they were actually losing money on this class of business in spite of the fact that their l.c.l. prices were considerably higher than their carload prices. A large percentage of the accounts on their books were small buyers, but the volume of sales in this class was but a small part of their total sales volume. Their sales organization was spending far too much of its time covering a lot of small, unprofitable accounts—time which could have been used to good advantage in going after large customers. They immediately decided to select a good jobber in each of their important consuming centers and turn over to them all of their l.c.l. business.

This use of jobbers has one important disadvantage which may in some cases overbalance the advantages. New users generally begin by buying l.c.l., but they may expand, or perhaps could be expanded by close service work, into carload buyers. The producer loses contact with this class of trade and may lose opportunities to develop important new outlets for his material. If the new business develops into carload business, the customer naturally wants the standard carload prices. If the jobber cannot give it to him he goes direct to the producer, who is then faced with a problem. Shall he sell direct to the customer and antagonize the jobber who developed the business, or shall he sell the account direct and protect the jobber with a commission, or shall he refuse to sell direct? If he refuses to sell direct the customer will probably buy direct from some other producer.

Another disadvantage in the use of jobbers is the fact that a producer loses that close contact with the customer, so often needed to keep an account sold and a customer satisfied. Often a jobber will handle the same product made by several different producers. He will naturally sell most of that material which sells easiest or on which he makes the greatest profit. He handles a great many different raw materials and sells them to many different industries. He cannot have the same intimate knowledge of each material that the producer has, nor can he study industrial processes in such detail.

Usually he does not attempt to service his markets, beyond reporting complaints back to the producer. And on complaints he usually says, "The last car of talc (or feldspar or clay) you shipped us was no good." Sometimes he will not even tell the producer for what purpose his material was used, to say nothing of revealing the name of the customer. Perhaps he will say it is too coarse or too fine or "off color" or something like that, but will give no real data on which an intelligent study of the complaint may be made.

Very often it is not the material at all which is at fault. It may have been contaminated with other materials in the jobber's warehouse or during delivery to the customer on the jobber's truck; or the jobber may have sent the wrong material; or the consumer's process or equipment may have gone wrong.

Unless such complaints are adjusted in-

telligently a customer may be lost or an important new use wiped out at the start. Jobbers often guard the names of their customers so jealously that no producer-consumer contact may be established. For many materials this is a vital point.

Sales Agents

Sales agents may be used effectively in distributing certain types of materials under the right conditions. For example, a large company producing a group of closely allied materials may have, as a by-product, relatively small quantities of a wholly different material, used by an entirely different class of trade. Their regular salesmen cannot sell this material effectively, both because they do not have the necessary knowledge and because their regular sales routes do not cover the points of consumption for this material. In such cases the services of a sales agent on a fixed commission basis may be used to good advantage.

This sales agent probably already handles several allied materials and can handle the marketing of this material at a fraction of what it would cost the producer, as well as much more effectively. If possible, however, a sales agent should be chosen who does not handle the same material or similar competing materials made by other producers. If he does, he will push the material which he can sell easiest or on which he makes the most profit and the new material may not get a fair chance.

Another situation often exists which indicates the use of sales agents. A small company with limited finances starts to produce a material which is rather difficult to sell and which is sold in relatively small quantities over a wide area. The cost of covering the trade and slowly developing markets is often quite large. If this producer can tie up with able, well known sales agents covering his markets, he can well afford to accept lower prices and pay the agents' commissions. If he selects the proper agents he will not only develop his markets faster, but his sales cost will be lower and he will make higher profits. During the first few years of the new company's existence, and perhaps permanently, selling through sales agents may be the cheapest and best method. Producer-consumer contact is not necessarily lost, for the interests of the producer and sales agent are identical, and the producer may do the servicing.

Dealers

Producers may sell through a few exclusive dealers, in which case the producer's relations with the dealer may be about the same as with sales agents, except that the dealer buys outright and sells at any price he can get, instead of working on a commission. Also the dealer probably will warehouse the material and sell both in carloads and l.c.l. while with a sales agent, warehousing, if any is done, must be done by the producer.

If a very few exclusive dealers take the entire output of a plant and look to one producer for their entire supply of this raw material, the producer does not need any salesmen on the road. This condition prevails, however, in but few commodities. In the industries where the dealer method of sales is well established, such as the portland cement industry, the producer has to maintain a corps of salesmen to sell to the dealers, who, in turn, have their salesmen to sell to the ultimate consumers.

In the sale of most building materials this dealer method of sales is firmly established. Thus the sale of portland cement, lime, gypsum plaster, brick, tile and other products used for building construction purposes is nearly always handled through building material dealers. Trade practices pertaining to this method of sale are quite definite and are closely adhered to by most producers and dealers of the better type. Producers will not sell direct to consumers in a town where there is a legitimate dealer handling their products, or if he does, he does it with the dealer's knowledge and consent, at the dealer's retail prices and with a proper commission to the dealer. Years of experience have shown that there are strong, sound business reasons for this policy.

A strong dealer establishment is essential to producers of materials of this type. A dealer can make or break a material in his town. A single sale by a producer direct to a retail consumer over the dealer's head may make an immediate profit, but if it antagonizes that dealer and all other dealers in that town and in neighboring towns it is a very bad piece of business for the producer. The retail customer probably will not enter a "repeat" order for years, if ever, but the dealer is buying continually.

Producers very carefully investigate a new dealer who wants to handle their materials. They first ask if he is really a legitimate dealer or a contractor who is seeking to pose as a legitimate dealer, how strong he is and how he is regarded in his community by other dealers and by the retail trade. Will selling him antagonize the other dealers to such an extent that there will be an ultimate loss of business? It is very easy to make a mistake in selecting dealers in a town and this always should be given careful study. Adding a new dealer does not always mean added sales—it may mean the reverse.

In selling a new dealer the question often arises as to whether or not he should be an "exclusive" dealer—that is, whether or not he should be the only dealer in that town to handle the producer's line of materials. Occasionally perhaps the establishment of exclusive dealers is good business, but many large producers have turned against it. If a so-called exclusive dealer handles competitor's products as well as your own, in other words, if the exclusiveness is all one sided, the situation is particularly bad. In a town where there are a number of dealers it rarely pays to give exclusive sales rights to any one of them. No one dealer can do all the business; a certain proportion of the trade will not do business with him, and by limiting your sales to one dealer you automatically cut yourself off from a portion of the market.

Type of Salesman

If a large company uses its own salesmen exclusively and it has a great many different products to sell, the question arises as to whether the sales territories should be relatively small and each salesman given the complete line to handle or whether larger territories be adopted and the commodities split up into several groups, with specialty salesmen handling each group.

In the latter case each sales territory (often each customer) is called on by several salesmen from the same company. Some of the arguments in favor of specialty men are: (1) Having only a few commodities to sell, the salesman can know each one more thoroughly and do a more efficient job of selling; (2) he will not confuse the dealer or buyer by trying to talk on too many subjects during a call; (3) he will have a better chance to be given sufficient time to tell his story, since a few commodities will not need as much time as many materials. Arguments against specialty men are: (1) Traveling expenses are higher since several men instead of one are going over the same ground; (2) fewer customers or prospects can be covered per day with a given number of salesmen; (3) several salesmen from the same company calling on a customer may arouse resentment at the amount of his time they consume.

Often a combination of the two methods works out satisfactorily. Regular line salesmen handle the routine selling of most of the commodities. In developing new products or introducing old products into new markets, or in selling highly specialized products to a distinctly different trade, specialty men may be used to supplement the line salesmen. They may work entirely independently or they may work closely with the line salesmen, with the aim of teaching the salesmen to handle the special accounts later.

No hard and fast rules for handling special sales may be laid down; each case has to be considered on its own merits and frequent changes made in organization as the work progresses. If a line of products gets to be too large and diversified, however, some splitting up into groups handled by different salesmen is imperative if anything like efficient selling is to be done.

Building Material Sales

The number and diversity of products which one salesman can sell effectively depends largely on the products, and whether the selling is done to dealers or to industries. Many staple commodities handled by a building material dealer largely sell themselves

and must do this if much progress is to be made.

A good salesman sells himself and his company to a dealer and then largely just takes orders to keep up the dealer's stock of the staples. When he tries to add a new specialty to his line, though, he must do real selling. He may readily persuade the dealer that the new product is a good one and get him to take a trial order. But the good salesman doesn't stop here. He helps the dealer demonstrate and sell the product, and does "job work" to build up a consumer demand.

If the salesman has a lot of such specialties and but few staples to sell his task is a hard one and his progress is often slow. Sooner or later many of these specialties, if they are good, become staples and less intensive sales effort is needed. In the introductory period, where much demonstration, education and job work must be done, specialty salesmen in addition to the regular salesmen are often necessary.

Industrial Sales

In selling mineral products to industrial plants a different type of salesmen and different sales methods are needed. The salesman needs technical training, or at least an understanding of technical processes and methods. He must know the physical and chemical properties of his products. He must understand the processes and technique of the industries in which his products are used the part his products play in those processes, and what peculiar and specific properties are needed in his materials. He must be able to work intelligently with chemists and engineers and ceramists, as well as plant superintendents and foremen and craftsmen. He must have imagination and optimism to discover new uses and applications for his materials and to follow through to successful development such uses. In addition he must be a real salesman in order to sell the purchasing agent after his product has been accepted in the plant.

This method of selling industrial products has not always prevailed, and in fact is not universally used today, but the trend of the times is strongly in that direction. Large and successful paint, rubber, paper and ceramic companies now quite generally have their products and processes under close technical control. They demand uniform high quality in the raw materials they buy and use. Purchasing agents can negotiate prices and terms and deliveries, but they cannot pass on the quality and adaptability of the raw materials. So the mineral salesman has to deal primarily with the production and plant control men.

These men want facts and data, not high pressure sales arguments. They have little time or use for a salesman who does not know his products or *their* processes and who does not understand or talk the language of their industry. And so a new type of sales-service engineer or sales-service chemist has come to the front—men who can sell service, demonstrate, assist in solving plant problems, develop processes and so on.

It is unfortunate but true that all industrial selling today is not yet on the basis of technical control and accurately observed performance. Perhaps it never will be. There is still much unintelligent prejudice on the part of the users and considerable buncombe on the part of the sellers, particularly in small companies or in the older companies which have not kept up with technical advancement.

Where a plant superintendent insists on buying "1000-mesh" silica and there is no such thing obtainable, what is the seller to do? Should he withdraw and let some competitor take the business, or should he try to educate the buyer, or should he sell his material (which he knows to be entirely suitable for the intended use) as a "1000-mesh" product? The first alternative may be the best ethically, but it is not good business. Educating such "practical" men is often impossible and at the best usually an unprofitable and thankless job. So often the seller, with such mental reservations as he feels necessary, adopts the third alternative.

Often mineral products play obscure and little understood roles in industrial processes. Of two products which look and feel identical and which seem, by all ordinary tests, to be equal in quality, one may be entirely satisfactory for a given use and the other may be unsuitable. Technical knowledge and testing methods have not developed far enough to enable us to test such materials and predict in advance how they will behave in actual use. This often makes the introduction and sale of a new product, even where both the producer and the consumer are intelligent and able, a slow and difficult job. Where lack of intelligence and prejudice are factors conditions are still worse.

All of this demonstrates that the marketing of mineral products, especially for industrial use, involves much more than the simple sales methods used for many other commodities.

(To be continued.)

Will Restrict Road Bonds

STATE tax commissioners will refuse to approve road or public building bond issues bearing more than 4% interest, it has been announced by James Showalter, state tax board chairman of Indiana.

The announcement came upon rejection of three proposed gravel road bond issues for Starke county, each bearing 5%.

"Four per cent. is ample interest for these nontaxable securities at this time and they can be sold at a premium at that price," Mr. Showalter said.

"Our board will also rule that the premium is enough to cover all incidental costs connected with gravel road construction over and above the contract price."

Cleaning of Gravel and Stone

THE RELATIVE ADVANTAGES of cleaning gravel or stone by washing or by a dry process or by a combination of both were discussed in a recent paper by Alfred B. Searle, given before the British Institute of Quarrying as reported in *Cement, Lime and Gravel.*

According to Mr. Searle the two methods are not equally suitable for all stones and gravels and a proper choice between a wet or a dry process of cleaning naturally depends largely on the nature of the materials, the amount of impurities, the amount of moisture contained in them, the availability of water, the means for disposing of slurry or dust, and the use to which the stone or gravel is to be put.

When the stone or gravel contains a great deal of clay, and particularly plastic clay, better results may be obtained by washing, whereas the dry process may often be better where the material to be removed is sand or clay of a lean, loamy nature. In some cases dry cleaning preliminary to washing works out very well and reduces the total cost of washing because of the ease with which the bulk of the undesirable fines are removed during the dry operation.

Dry cleaning has obvious advantages where it can be used but has been objected to on the ground that it is not always effective, as in the case of damp materials, and that it is more costly where drying must be resorted to. However this is not always the case as complete drying is seldom necessary and such drying is not such a serious or costly problem.

The dust resulting from a dry process of cleaning need not be any more objectionable than the slurry from a wet cleaning process, as it can be collected and disposed of more cheaply than slurry.

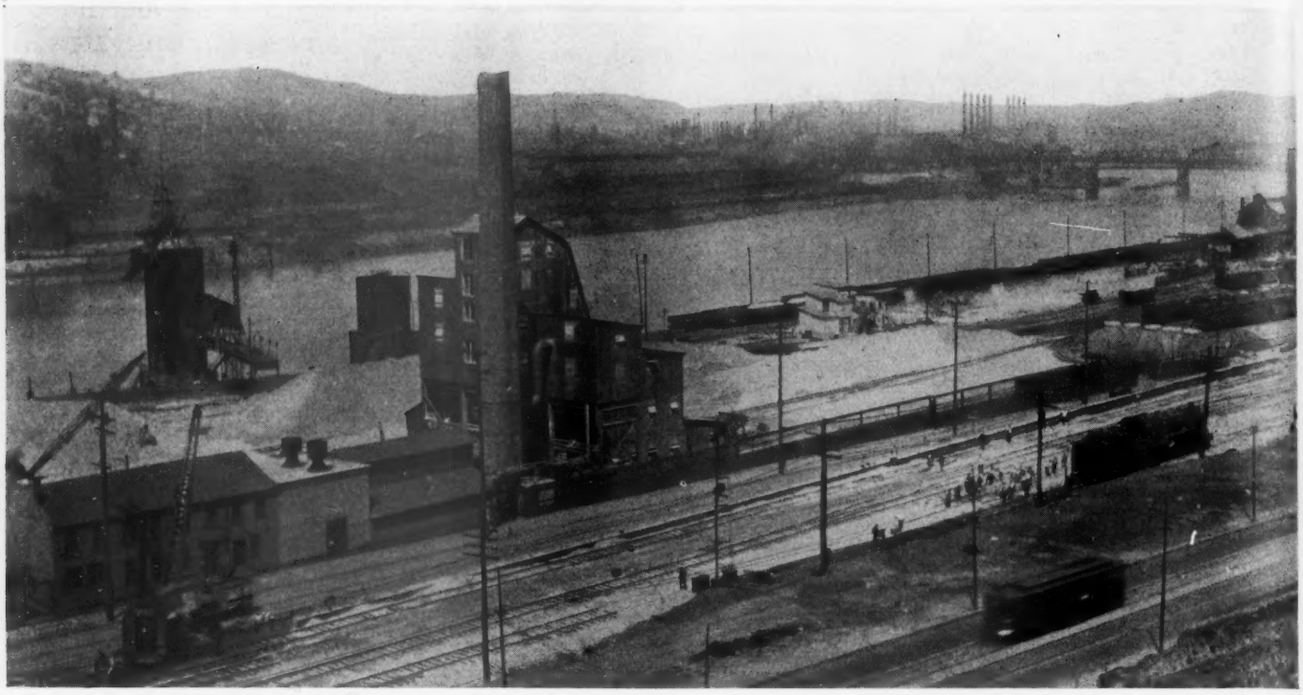
The first object of either a wet or dry cleaning process is to loosen the impurities from the stone and this is done most effectively by tumbling the material vigorously in a rotating drum, after which the loosened material may be separated by screens or sieves.

Vibrating screens are most effective, according to Mr. Searle, because they help to loosen the fine particles and pass them more readily through the meshes.

New Pavement Awards

CONCRETE PAVEMENT yardage awarded in the United States during the month of August, divided according to roads, streets, and alleys, as reported by the Portland Cement Association, and the totals for the eight months' period ending August 29, 1931, are:

	Yardage awarded	
	During August, 1931	To Aug. 29, 1931
Roads	5,437,434	95,414,767
Streets	2,146,335	16,033,713
Alleys	90,930	603,820
Total	7,674,699	112,052,300



General view of plant and yards of Duquesne Slag Products Co., Pittsburgh, Penn.

Modern Slag Crushing Plant

Duquesne Slag Products Co., Pittsburgh, Penn., by Careful Sizing and Recombining Meets Exact Grading Specifications

THE NEW PLANT of the Duquesne Slag Products Co. at Pittsburgh, Penn., is interesting as showing modern practice in the production of crushed slag.

This plant, which was put into operation during 1930, is located adjacent to the Eliza furnaces of the Jones and Laughlin Steel Corp., from which the slag is obtained, on a site bounded on one side by the Monongahela river and Monongahela Connecting Railroad and on the other by Second Ave. It is about 1½ mi. from downtown Pittsburgh and hence well located for truck haulage. In its design equipment was selected and arranged so as to insure accurate grading of the product and provisions were also made for recombining the different sizes in any desired proportions.

The slag is crushed and screened into seven sizes exclusive of the product from the dust collecting system. Below the bins containing these different sizes a mixing conveyor is arranged so that they may be recombined in any proportions to meet any desired grading specifications just before loading into railroad cars or trucks. This mixing operation, as well as the loading, is under the control of one man.

A screen just ahead of the loading point removes any dust which may have accumulated in the bins. Care is also taken to prevent segregation during loading into railroad cars.

Any pieces of iron in the slag after crushing are removed by magnetic pulleys at three different points during the sizing and loading operations. Vibrating screens are used throughout and these are enclosed and connected with a dust collecting system.

Slag pit and electric shovel loading car

The plant is of steel construction with galvanized corrugated iron covering. All units are driven by individual motors which have automatic push-button-operated starters electrically interconnected in such a way that they must be started in proper sequence opposite to the flow of the material and so that the stopping of any unit will automatically stop all other units feeding material to it. In this way plug-ups at any point and their attendant delays and expense are prevented.

The starting equipment and switches are located in a separate building away from the dust, thus avoiding trouble from that source. The push buttons which control the equipment in the main part of the plant

are all arranged in one row at a central point from which practically every piece of equipment can be seen by the operator.

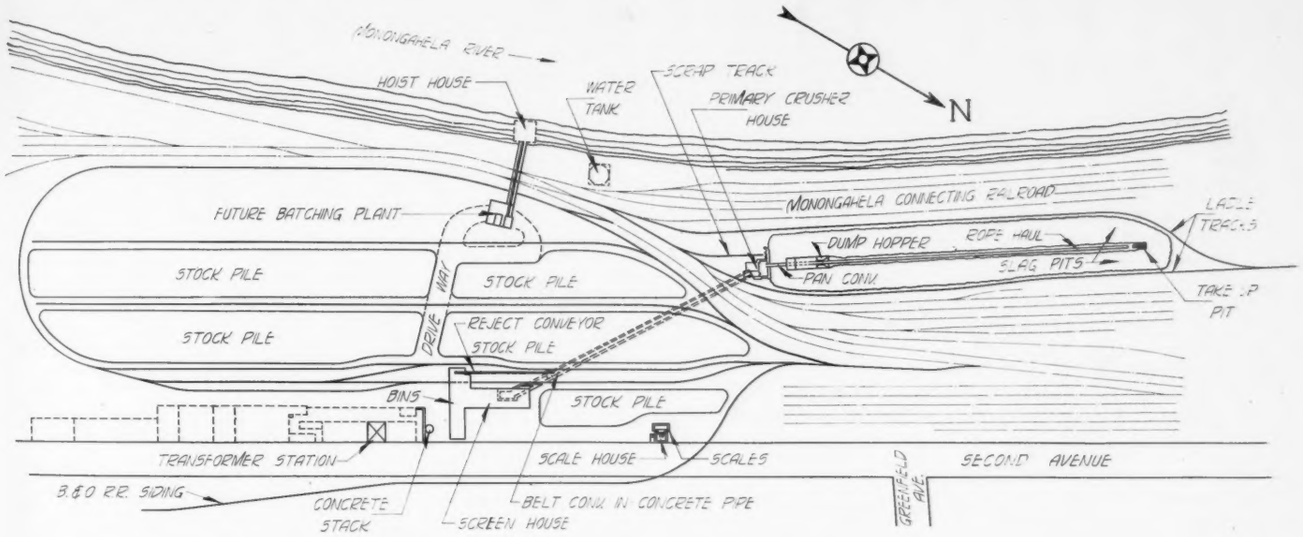
The plant was designed by E. J. Winkleman, chief engineer, and C. C. Burgess, operating manager. As now operated it has a capacity of about 1000 tons per day and is so arranged and systematized that it operates smoothly with very few men.

Slag Pit

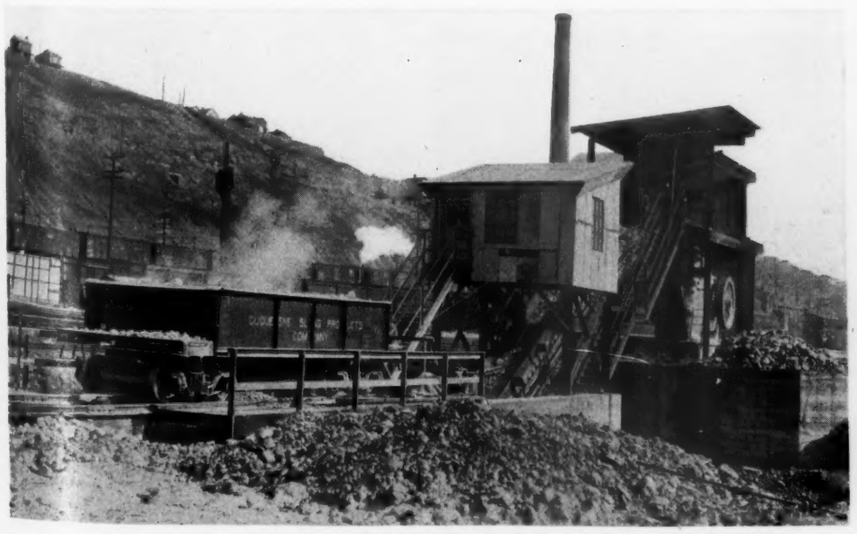
The slag pit is divided longitudinally through the center by the standard gage loading track over which the excavated slag is transported to the plant and each half of the pit is worked alternately. That is, the molten slag from the furnaces is poured on one side and allowed to harden and cool while the other side is being excavated.

A 1¾-yd. 50-B Bucyrus-Erie electric shovel is used for excavating, loading to

Screening and loading plant; car loading point at left and concrete stack for dust vent at right



Layout of plant showing storage and handling yards, and railway connections



Car at dumping point over track hopper with conveyor picking table and primary crusher at right

a 20-ton drop-bottom hopper car which is moved back and forth between the shovel and the track hopper by a motor driven drum hoist and wire rope. The car has a travel of about 500 ft., or the length of the pit, and is automatically emptied at the track hopper and the bottom gates again closed by trip bars alongside the track.

The hoist is arranged with a dial having a graduated scale representing the total travel of the car and an adjustable pointer and switch, so that the car can in that way be automatically stopped at any point for loading. Push buttons above the dial also permit starting and stopping the car independently of the dial. The hoist is driven by a 33-hp. double speed motor operating at speeds of 150 and 900 r.p.m.

At the bottom of the track hopper a reciprocating feeder delivers the slag to

a 48-in. inclined pan conveyor carrying up to the primary crusher. The feeder is driven by an individual 7½-hp. motor through a speed reducer and is arranged so that both the travel and the speed may be varied.

The top part of the pan conveyor is horizontal and arranged so that any large pieces of iron can be picked out by a man stationed at that point. This material is thrown directly into a railroad car alongside and below the picking platform. The conveyor, which discharges directly to the primary crusher, is driven by a 25-hp. motor through a Falk speed reducer connected with the head shaft.

Primary Crusher and Tunnel Conveyor

Primary crushing is done in a 42-in. by 40-in. Allis-Chalmers Superior jaw crusher, driven by a 125-hp. motor through a Texrope drive.

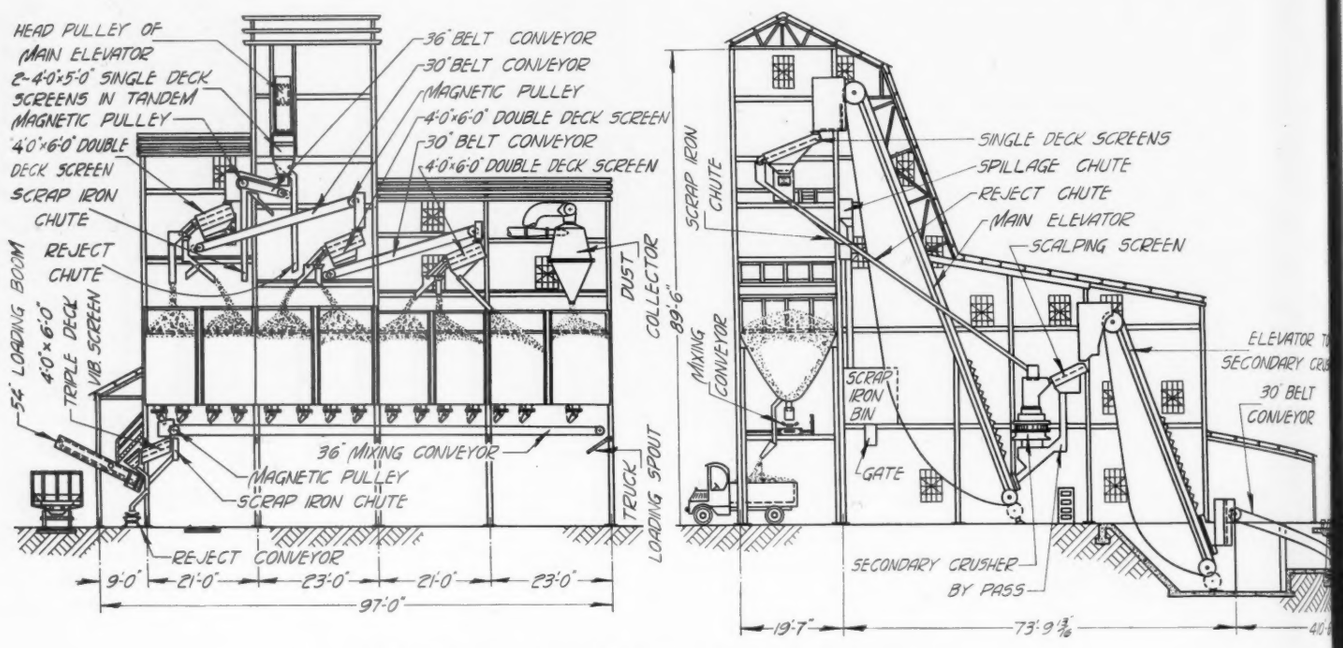
From the crusher the material falls to a 30-in. belt conveyor 410 ft. long which carries below ground under the main line of the Monongahela Connecting Railroad and part of the slag storage space to the main screening plant.

This conveyor was placed under ground rather than overhead as that method seemed to simplify matters and avoided any interference with the locomotive crane and railroad equipment used for stock piling. An 84-in. diam. precast reinforced concrete pipe was used for the conveyor tunnel instead of the more usual poured concrete, giving a satisfactory tunnel at minimum cost.

Scalping and Secondary Crushing

The tunnel conveyor discharges to a 26-in. belt bucket elevator 49-ft. long which carries up to a scalping screen where the oversize material is taken out for recrushing. The scalping screen is a single deck vibrating screen 4-ft. wide by 6-ft. long and is driven by a 5-hp. motor. All of the screens except one were furnished by the Pittsburgh Coal Washer Co., Ambridge, Penn.

The scalping screen is arranged so that the fines passing through it fall to the main elevator and the coarse material passing over the end of the screen falls to a 4-ft. Symons cone crusher direct-connected to a 100-hp. motor. The material from the cone crusher joins the fines and is carried to the top of the screen house in a 26-in. by 81-ft. belt bucket elevator.



Sectional view of screen house and loading arrangements

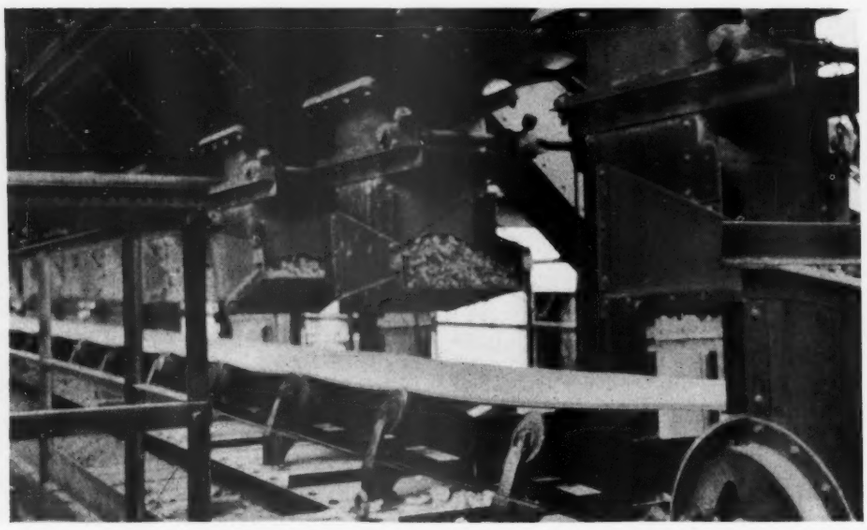
The scalping screen is arranged so that the fines passing through it fall to the main elevator and the coarse material passing over the end of the screen falls to a 4-ft. Symons cone crusher direct-connected to a 100-hp. motor. The material from the cone crusher joins the fines and is carried to the top of the screen house in a 26-in. by 81-ft. belt bucket elevator.

Main Screening Plant

The main elevator discharges to a vibrating screen unit made up of two 4-ft. by 5-ft. single-deck screens in tandem where any oversize or plus 3¼-in. material is scalped out and returned through a chute to the secondary crusher.

The material passing through this screen falls to a short 36-in. inclined belt conveyor having a magnetic head pulley where any scrap iron is removed and the material delivered to a 4-ft. by 6-ft. double-deck vibrating screen which is the first of a set of three screens used for the final sizing.

Here the two larger sizes are screened out and spouted to the bins below and the material passing through the lower deck is carried on a short inclined 30-in. belt conveyor to a second 4-ft. by 6-ft.

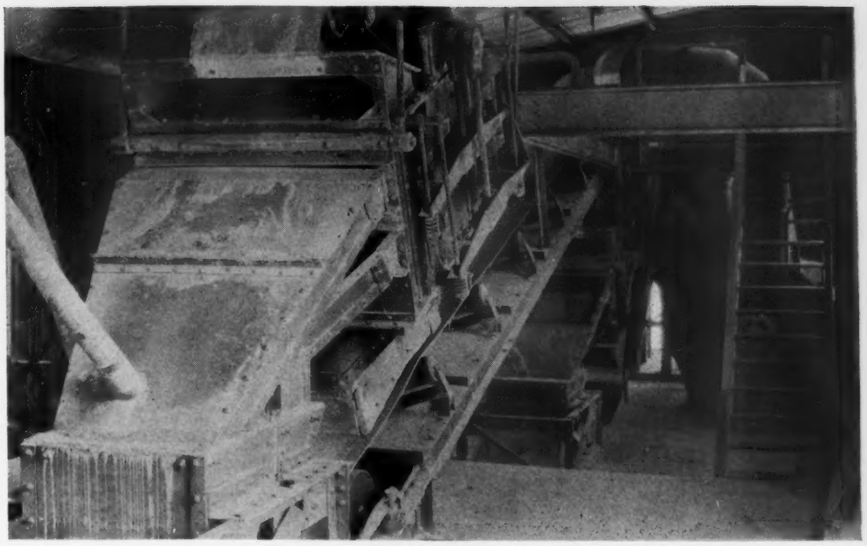


Mixing belt and bin gates before the installation of the control levers and cables

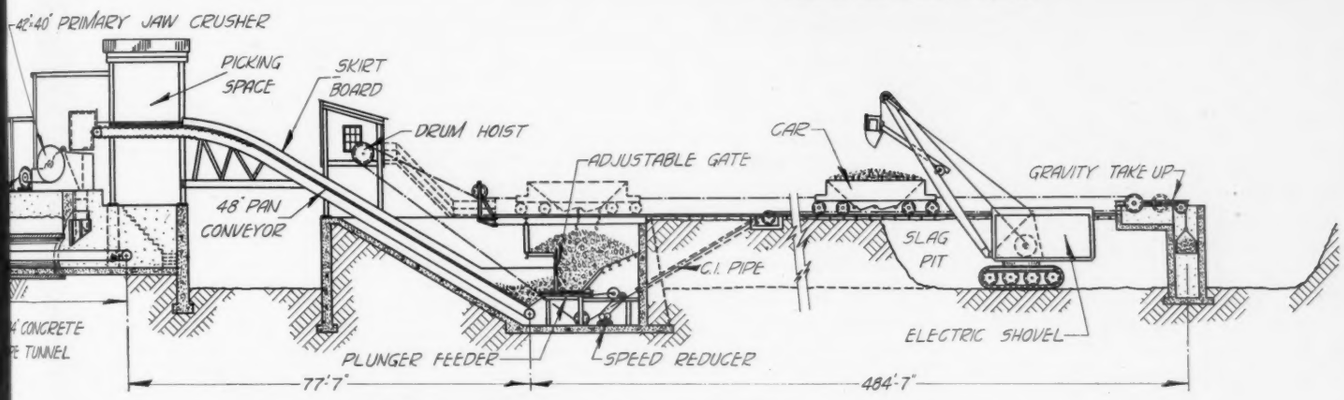
double deck vibrating screen. This conveyor also has a magnetic head pulley for the removal of any iron not taken out by the first pulley and the pieces of iron from both are delivered by spouts to a scrap iron bin located above a railroad track where it is drawn into cars.

The second screen removes two more sizes to the bins below and the balance passing through the lower deck is carried on a short inclined 30-in. belt conveyor to the third screen, where the three smaller sizes are separated out and spouted to the bins. Thus seven sizes are made, ranging normally from 3½-in. down to dust, the smallest size from the screens being from ⅜-in. to dust. By changing the screen sections these sizes are easily and quickly varied to meet any requirements.

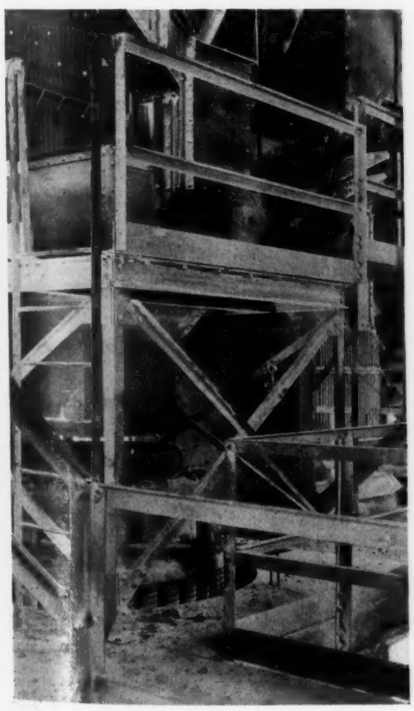
All screens and other dust producing points are connected by piping with a dust collecting system consisting of two cyclone collectors and a fan driven by a 25-hp. motor and the dust and fine material is deposited in the end bin. As a result of this dust collecting installation the plant is comparatively free of dust.



One of the sizing screens



Section showing course of raw material from slag pit to crusher



Secondary crusher and scalping screen

The steel bins are of the parabolic-bottom type so that they are practically self-cleaning and are arranged with gates for loading direct to trucks or to the mixing belts. Each of the eight bin compartments has a capacity of about 75 tons.

This part of the plant is handled by two men, one looking after the screens and one at the secondary crusher within reach of the push buttons controlling the motors.

Mixing and Loading

Below the bins a belt conveyor 36-in. wide by approximately 85-ft. long is used for recombining the different sizes and conveying them to the loading point. This conveyor also has a magnetic head pulley for removing any iron not taken out by the other two pulleys in the screen house above, these three pulleys being furnished by the Magnetic Manufacturing Co., Milwaukee, Wis.

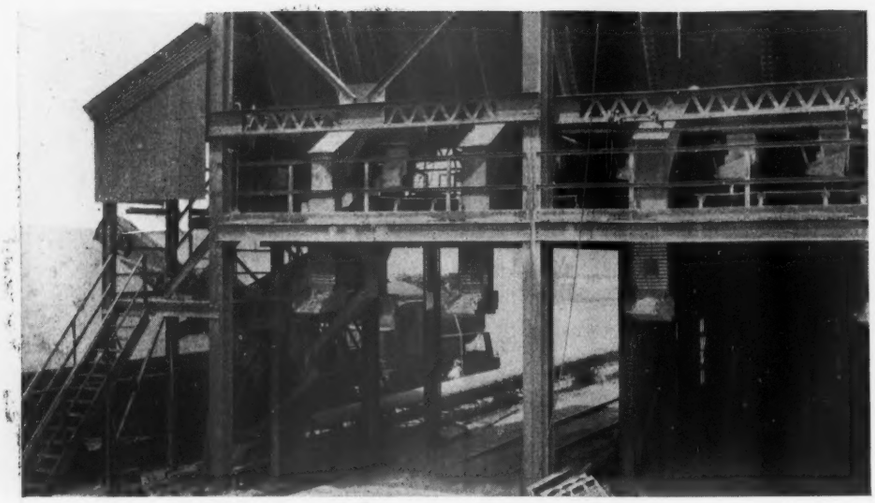
Each bin compartment has two gates which are located on the center line of the bins and discharge directly on to the belt. These gates are of the hinged type and are operated from one point by quadrant type levers connected by wire cables with the gates. Thus one man at the discharge end of the conveyor accurately controls the mixing of the various sizes and the loading.

Loading Direct to Trucks

In addition a set of gates, located on one side of the center line and consisting of one gate in each bin compartment, allows loading any size direct to trucks below.

The conveyor discharges to a 4-ft. by 6-ft. triple deck Niagara vibrating screen where the material receives a final cleaning and any fines which may have accumulated in the bins are removed. These are returned to the plant on a horizontal belt conveyor above ground which discharges to the main tunnel belt conveyor.

The use of a triple deck screen at this point permits a very thorough cleaning of the material as it goes to the cars. The screen is also arranged so that with slight alterations the material may be washed should it be found desirable later.



Loading arrangements at bins

From the screen the cleaned product falls to a 54-in. inclined pan conveyor or loading boom which is hinged so that it can be swung up out of the way when not in use. The discharge end of the loading boom is equipped with an oscillating plate actuated from the head shaft by a rod and crank so that it swings back and forth to spread the material uniformly across the car during loading. This largely prevents the segregation of the finer sizes in the center of the car and the coarser sizes on the outer edges.

The mixing conveyor can also be used to load mixed sizes to motor trucks, this being done by reversing the direction of the conveyor so that it discharges over the tail pulley to a chute and thence into the truck.

Equipment for Stockpiling on Ground Storage

Considerable ground storage is available for stock piling separately each of the various sizes. This is done by loading from the bins to 35-yd. standard gage side dump cars which are moved by a steam locomotive to the storage point and dumped. A locomotive crane with clamshell bucket is used to pile the material and to reload it to railroad cars.

In addition to the present plant a truck loading plant consisting of a track hopper, elevator and bins is now under construction. This will be arranged so that the various sizes may be handled in railroad cars from the storage to the truck loading bins.

General

Slag plants are also operated by the company at seven other points in Pennsylvania and at one point in New Jersey. The general offices are at 808 Diamond Bank Building, Pittsburgh, Penn. C. L. McKenzie is president and general manager; A. N. Spice, vice-president and sales manager; C. C. Burgess, operating manager, and E. J. Winkleman, chief engineer.

Tells Why New York Sand and Gravel Is Not Used in Buffalo

CHARGES that Buffalo, N. Y., paving concerns holding city paving contracts are using gravel brought from Canada in a Canadian boat manned by Canadians, resulting in 125 Buffalo men employed by local sand and gravel companies being thrown out of work, were made recently by George L. McLelland, head of the Municipal employment agency.

The reason that sand and gravel from New York state are no longer being used at Buffalo is because the attorney general late in July issued orders to all sand and gravel producers in the state prohibiting them from removing sand or gravel from state waters, according to a statement issued September 14, by the Buffalo Slag Co., following charges American producers were being discriminated against by local paving contractors.

As a result of this order, the sand dredges of all sand and gravel producers in the state were tied up, throwing many men out of work, the statement added.—*Buffalo* (N. Y.) *News.*

Announces Improvements

THE Marquette Cement Manufacturing Co., Chicago, Ill., recently announced plans for the installation of new equipment designed to increase the efficiency of kilns, utilizing waste gases in the burning of cement. The equipment will represent an investment of $250,000.

Announcement that installation of the equipment had been approved by the company's heads was made by Richard Moyle, Sr., operating head of the Marquette plant at Oglesby, Ill., following conferences with executives of the company in Chicago.

Installation will start this fall, it is said, and will proceed in such manner as to avoid interference with the operation of the plant. —*Spring Valley* (Ill.) *Gazette.*

New York Crushed Stone Association Meets

ON SEPTEMBER 3 the New York State Crushed Stone Association met at Le Roy. No official report was made of the morning's outing other than that it was diverse and interesting. The "Colprovia" and "Amiesite" plants attracted a number of the members, while others participated in a round of golf. At noon a typical "barn" dinner was enjoyed, after which the business meeting was held at "Len" Heimlich's cabin.

After the minutes of the July 31 meeting were read by the secretary and approved, attention was centered upon the proposed action of the state highway department to require washing of all crushed stone in the 1932 specifications and contracts. After full discussion of this action John Rice, Jr., presented a resolution providing that the association committee that conferred with State Highway Commissioner Brandt on July 13 again meet with him in company with A. T. Goldbeck, engineering director of the National Crushed Stone Association, to obtain a definite understanding of the policy of the department. The motion was carried and the committee is to report to the association at its next meeting. President Owens then called on J. R. Boyd, secretary of the National Association, who made a splendid address to the meeting. In his remarks Mr. Boyd touched upon some of the reasons for the existence of a national association and went into detail in mentioning what it meant to and accomplishes for its members. He stressed the important functions of the research laboratory and the resultant benefits to the industry. Mr. Boyd was outspoken in his condemnation of price cutting, claiming that this was a serious matter because so many members did not actually know their true costs and were only fooling themselves when they thought they could sell below cost. He vigorously urged the necessity of knowing the true costs of production, and stated that the national association was willing and desirous of co-operating with its members to help them avoid financial difficulties through lack of knowledge of real costs. Mr. Boyd's remarks were well received and he got "a big hand" at the conclusion of his address.

After discussing other topics of a minor nature a resolution was passed to leave the time and place of the next meeting to the call of the chair.

It was then moved and carried by a standing vote that the thanks of the association be tendered to Mr. Heimlich for his efforts in arranging so pleasant a meeting.

Adjournment took place at 4:30, after which the members took part in outdoor sports, the high spot of which was Fred Foote's sliding safely into third.

Thirty-one members were present to participate in the activities.

An Open Letter to the Construction Materials Industry

THE TIME has arrived for frank speaking, clear thinking and courageous action by the construction industry.

Winter looms ahead with the practical certainty of continuing unemployment.

The President of the United States has drafted leaders of finance, industry and labor to head a movement for relief.

Red Cross, community chest and other similar organizations have appraised the prospects and are drafting their appeals.

The country will respond as it has responded in every emergency. There will be food for the hungry and shelter for the homeless—but what a pity if all this generosity must take the form of public charity without first exhausting every possibility for providing a job for the American who wants—above all things—a chance to retain his self-respect and earn his own living.

The man who said, "The only sure cure for unemployment is employment," sounded the depths of true economics. The dozens of other abstract prescriptions and theories which have been advanced as remedies for unemployment seem visionary when confronted with the fact that work for men and pay for work constitute employment—and without work and pay, unemployment cannot be diminished.

With this principle established, the question arises, "What is to be done about it?"

There is only one answer — push necessary public works construction.

Public construction—by the national government, by the states and counties and by municipalities, large and small—is the only avenue through which any considerable number of men can return promptly to economic security.

Public construction can be put to work at once. It offers an unlimited field. It constitutes a reservoir of employment, far greater than any demand which can be put upon it. Under competent leadership and management, it could and should be utilized to the utmost immediately.

Thomas H. MacDonald, chief of the United States Bureau of Public Roads, stated recently that three-quarters of the cost of roads is paid out in wages to labor. The proportion is about the same for public structures. Every thousand dollars invested in public works provides a $750 payroll. If only a minor portion of the public projects authorized or in advanced stages of planning were pushed to the point of actual construction, employment would be provided for thousands of workers. The necessities of these workers would create employment for many others.

On the authority of E. Joseph Aronoff, director of the Public Works Section of the President's Emergency Committee for Employment, over $6,000,000,000 worth of works which would go ahead normally have been reported to his committee since last November. Out of this total, $4,000,000,000 worth have not yet reached the actual construction stage. Mr. Aronoff estimates that $2,000,000,000 worth is far enough along so that it could be translated into labor-using activity without delay.

It is the duty of the public works officials to act in this emergency and to make practical use of the knowledge that in their hands they have the opportunity to give employment to thousands.

Will they exercise this authority? Will they—the legislators and administrators —take necessary steps to increase public construction?

We cannot answer these questions. But we believe that the construction industry should insist upon an answer from every elected or appointed representative who has anything whatever to do with public works.

—The Editors.

Researches on the Rotary Kiln in Cement Manufacture*

Part XXVII—Calculation of the Amount of Steam Producible per 100 Tons of Clinker in the Rotary Kiln, Together with a Discussion of the Waste-Heat Boiler, Case (1)—When Slurry Moisture Is 40%, and Case (2)—When Slurry Moisture Is 0%

By Geoffrey Martin

D.Sc. (London and Bristol), Ph.D., F.I.C., F.C.S., M. Inst. Chem. Eng., M. Inst. Struct. Eng., M. Soc. Pub. Analysts, F. Inst. Fuels; Chemical Engineer and Consultant; Former Director of Research of the British Portland Cement Research Association; Author of "Chemical Engineering"

Abstract

ACCOMPANYING this calculation of the amount of steam producible per 100 tons* of clinker in the rotary kiln when slurry moisture is 40% and 0%, together with a discussion of the waste-heat boiler, are tables calculated from exterpolated values of specific heats from which it is possible to calculate in a very simple manner the weight of steam producible under almost any circumstances for any fuel consumption, slurry moisture, and degree of preheating of the entering air. These tables should be particularly useful to works engineers.—The Editors.

IN the preceding part, XXVI, were calculated the exit temperatures of the gases coming from cement rotary kilns using slurries containing different percentages of moisture (0 to 40%) and the kiln working with different fuel consumptions.

In the present chapter it is proposed to calculate the amount of steam producible by utilizing the waste heat contained in these gases.

For practical purposes it is sufficient to consider that the steam is produced in a waste-heat boiler at a gage pressure of 150 lb. per sq. in. This corresponds to a temperature of about 366 deg. F. inside the boiler. Hence the steam at this pressure can only be generated by the heat liberated by the exit gases in sinking from their exit temperature T deg. to 366 deg. F.

Now, the number of B.t.u.'s absorbed in turning 1 lb. of water at 366 deg. F. contained in the boiler under 150 lb. pressure into 1 lb. of steam at the same temperature and pressure is equal to the latent heat of evaporation of water under these conditions, being, according to Callendar's steam tables, = 863.1 B.t.u.

Hence, if Q B.t.u. be the quantity of heat available from a given quantity of gas in sinking from T deg. to 366 deg. F., then the amount of steam producible therefrom is

$$\frac{Q}{863.1} = Q \times 0.001159 \text{ lb.} \quad . \quad . \quad (1)$$

This is the mode of calculation adopted in this discussion of the utilization of waste heat from exit gases.

The weight of steam thus calculated is obviously the theoretical maximum. The practical amount will be less than this on account of the varying efficiencies of the boilers used in generating steam. Hence a reduction, depending upon the efficiency of the boiler used, must be made to obtain practical figures.

For some purposes, *e.g.*, when the steam is to be superheated, the practical engineer may prefer to know the value of the available B.t.u.'s per lb. of clinker which can be utilized for steam generation above 366 deg. F. This figure can easily be calculated from the weights of steam given in the table by multiplying the weight of steam given by 863.1, the latent heat of steam at 366 deg. F. and 150 lb. pressure, *e.g.*, if to 1 lb. of clinker we can obtain 1.2 lb. of steam at 366 deg. F. and 150 lb. pressure, then the number of B.t.u.'s available for steam generation at 150 lb. is

$$1.2 \times 863.1 = 1036 \text{ B.t.u.}$$

If the steam is to be superheated to T deg. and its specific heat is S, we have, if W be the weight of steam

$$1036 = W\,[863.1 + S\,(T - 366)],$$

or

$$W = \frac{1036}{863.1 + S\,(T - 366)} \quad . \quad . \quad (1)$$

Details of Calculating the Amount of Heat Q Contained in the Exit Gases per 1 Lb. of Clinker Produced by the Kiln

For practical purposes it is convenient to calculate the pounds of steam producible per 1 lb. of clinker produced in the kiln. The method is best illustrated by working through a particular case in detail, in which use is made of the data calculated in the preceding chapters.

Take the following case: Suppose that the rotary kiln is consuming 30.460 tons* of standard coal (12,600 B.t.u. per lb.) per 100 tons* clinker produced. This amounts to 3.283 lb. of clinker per 1 lb. of standard coal burnt.

Suppose that the slurry contains 40% of moisture and the air meets the coal dust preheated to 400 deg. F., then the quantities associated with these numbers, calculated on 3.283 lb. of clinker, are:

Furnace gases, 11.278 lb.
CO_2 evolved from slurry, 1.720 lb.
H_2O evolved (*a*) from kaolin.....0.0844 lb.
(*b*) from silica.....0.0355 lb.
(*c*) from slurry.....3.4150 lb.

Total H_2O .....3.5349 lb.

Exit temperature of kiln gases, 914.3 deg. F.

The instantaneous specific heat of the furnace gases at 914.3 deg. F. is 0.2640, and at 366 deg. F. is 0.2471, thus giving a mean specific heat of the furnace gases between 914 deg. and 366 deg. F. of 0.2556 deg. F.

The maximum temperature drop of the gases between entering the boiler and emerging therefrom is

Exit temperature — 366 deg. F. = 914 deg. — 366 deg. F. = 548 deg. F.

The quantity of heat Q available is now calculated as follows:

(*a*) The B.t.u.'s evolved when 11.278 lb. of furnace gases sink from 914 deg. to 366 deg. F. are

$11.278 \times 548 \times 0.2556 = 1579.976$ B.t.u.

(*b*) From our heat tables the B.t.u.'s liberated when 1.720 lb. of CO_2 sink from 914 deg. to 366 deg. F. are

$1.720\ (205.633 - 71.573) = 230.583$ B.t.u.

(*c*) From our heat tables the B.t.u.'s liberated when 3.535 lb. of steam sink from 914 deg. to 366 deg. F. are

$3.535\ (414.446 - 156.116) = 913.197$ B.t.u.

Hence the total number of B.t.u.'s liberated when the temperature of exit gases sinks from 914 deg. to 366 deg. F. is

$$1579.976 + 230.583 + 913.197 = 2723.756 \text{ B.t.u.}$$

*English ton of 2240 lb. To transpose to American tons multiply by 1.2.

TABLE I.* SHOWING THE NUMBER OF POUNDS OF STEAM AT 150 LB. GAGE PRESSURE PER SQ. IN. PRODUCIBLE PER 1 LB. OF CLINKER PRODUCED WHEN THE SLURRY MOISTURE IS RETAINED CONSTANT AT 0%, BUT THE ENTERING AIR IS PREHEATED TO VARIOUS DEGREES BY THE OUTGOING CLINKER†

Clinker production		Entering combustion. Air preheated to 100 deg. F.		Entering combustion. Air preheated to 400 deg. F.		Entering combustion. Air preheated to 800 deg. F.		Entering combustion. Air preheated to 1,000 deg. F.		Entering air at maximum temperature to which it can be preheated by outgoing clinker		
Tons of coal per 100 tons of clinker	Lb. of clinker per 1 lb. of standard coal	Exit temperature of kiln gases	Lb. steam producible per 1 lb. of clinker	Exit temperature of kiln gases	Lb. steam producible per 1 lb. of clinker	Exit temperature of kiln gases	Lb. steam producible per 1 lb. of clinker	Exit temperature of kiln gases	Lb. steam producible per 1 lb. of clinker	Lb. steam producible per 1 lb. of clinker	Temperature of entering combustion air	Exit temperature of kiln gases
(1)	(2)	(3) deg. F.	(4)	(5) deg. F.	(6)	(7) deg. F.	(8)	(9) deg. F.	(10)	(11)	(12) deg. F.	(13) deg. F.
11.893	8.408	.....	Imposs.	344.7	Imposs.	605.5	0.1325	739.2	0.2080	0.6471	2039	1469.4
12.525	7.984	227.6	Imposs.	420.4	0.0402	685.5	0.1842	821.2	0.2586	0.6866	1944	1491.9
13.210	7.570	381.0	0.01717	577.1	0.1253	845.5	0.2900	983.1	0.3777	0.7849	1853	1596.1
13.957	7.165	535.5	0.1050	733.8	0.2306	1006.7	0.4093	1146.3	0.5035	0.8911	1764	1702.3
14.791	6.761	694.1	0.2137	895.4	0.3498	1172.8	0.5441	1313.7	0.6423	0.8691	1674	1807.6
15.726	6.359	856.4	0.3385	1060.6	0.4871	1341.4	0.6950	1485.2	0.8062	1.440	1584	1918.2
16.770	5.963	1020.9	0.4808	1228.1	0.6416	1513.2	0.8690	1659.0	0.9879	1.292	1494	2029.6
17.960	5.568	1190.1	0.6451	1401.0	0.8211	1689.7	1.091	1837.8	1.196	1.470	1403	2146.8
19.301	5.181	1361.1	0.8318	1574.5	1.0233	1868.0	1.292	2018.3	1.429	1.659	1315	2259.9
20.855	4.795	1536.3	1.0522	1753.5	1.2595	2050.9	1.556	2203.4	1.7095	1.745	1226	2379.5
22.660	4.413	1715.0	1.310	1934.9	1.5404	2237.3	1.862	2392.0	2.060	2.149	1137	2499.6
24.801	4.032	1886.1	1.603	2108.2	1.855	2412.2	2.209	2568.2	2.397	2.441	1047	2605.1
25.044	3.993	1893.2	1.623	2113.4	1.887	2416.4	2.236	2571.5	2.420	2.4652	1041	2613.7
25.278	3.956	1914.8	1.663	2135.9	1.919	2439.9	2.280	2595.6	2.4699	2.5022	1031	2621.6
25.517	3.919	1929.2	1.691	2150.1	1.957	2453.5	2.314	2608.9	2.508	2.5288	1024	2627.6
25.760	3.822	1947.6	1.726	2168.9	1.986	2473.2	2.357	2628.9	2.550	2.563	1015	2636.8
26.021	3.843	1966.2	1.763	2187.8	2.027	2492.5	2.393	2648.5	2.568	2.598	1006	2645.4
26.274	3.806	1984.7	1.798	2206.6	2.068	2511.8	2.445	2668.0	2.6412	2.635	997	2654.6
26.532	3.769	1989.8	1.822	2210.4	2.089	2513.8	2.467	2669.2	2.6694	2.649	988	2663.8
26.802	3.731	1994.9	1.841	2214.3	2.111	2516.1	2.490	2670.6	2.688	2.664	979	2672.4
27.078	3.693	2015.5	1.882	2235.3	2.155	2537.6	2.542	2692.4	2.738	2.706	970	2681.9
27.352	3.656	2021.1	1.905	2239.7	2.179	2540.6	2.567	2694.4	2.767	2.733	962	2690.1
27.632	3.619	2038.6	1.946	2257.6	2.222	2558.8	2.611	2712.0	2.8125	2.766	953	2697.5
27.917	3.582	2057.7	1.984	2277.9	2.266	2578.7	2.673	2733.1	2.8353	2.807	944	2704.5
28.209	3.545	2074.2	2.025	2293.8	2.305	2595.9	2.707	2750.4	2.914	2.848	935	2711.0
28.514	3.507	2093.8	2.068	2313.8	2.354	2616.3	2.755	2771.2	2.965	2.892	926	2718.3
28.827	3.469	2112.6	2.114	2332.9	2.400	2638.8	2.820	2791.1	3.024	2.932	917	2727.3
29.137	3.432	2130.9	2.155	2351.6	2.449	2655.1	2.865	2810.4	3.080	2.982	910	2736.3
29.455	3.395	2136.5	2.183	2356.0	2.473	2658.0	2.891	2812.6	3.113	2.996	899	2745.7
29.771	3.359	2154.8	2.228	2374.8	2.524	2677.2	2.946	2832.0	3.166	3.035	891	2753.7
30.120	3.320	2174.9	2.273	2403.3	2.589	2713.1	3.024	2856.6	3.217	3.124	881	2760.7
30.460	3.283	2192.4	2.320	2413.0	2.631	2719.4	3.061	2871.9	3.286	3.1435	872	2771.9
34.305	2.915	2380.0	2.862	2604.0	3.211	2912.3	3.704	3070.2	3.961	3.650	781	2897.6
39.246	2.549	2549.7	3.515	2774.3	3.912	3083.4	4.483	3241.5	4.777	4.323	694	3000.4
45.766	2.185	2734.0	4.404	2961.2	4.878	3273.8	5.541	3433.7	6.586	5.213	605	3120.3
54.824	1.824	2876.2	5.533	3103.5	6.100	3416.1	6.902	3576.0	7.309	6.332	516	3193.0
70.126	1.466	3068.2	7.348	3297.8	8.058	3613.8	9.075	3775.3	9.754	8.124	428	3319.5

TABLE II.* CONDITIONS SAME AS ABOVE EXCEPT THE SLURRY MOISTURE IS RETAINED CONSTANT AT 10%

11.893	8.408	.....	Imposs.	Imposs.	Imposs.	Imposs.	Imposs.	299.2	.....	0.3645	2039	917.7
12.525	7.984	.....	Imposs.	Imposs.	Imposs.	266.6	Imposs.	382.6	0.0111	0.4919	1944	955.7
13.210	7.570	.....	Imposs.	Imposs.	Imposs.	418.0	0.0355	536.3	0.117	0.4963	1853	1063.4
13.957	7.165	.....	Imposs.	336.1	Imposs.	571.9	0.1467	692.5	0.2348	0.5742	1764	1075.1
14.791	6.761	.....	Imposs.	491.4	0.09689	731.9	0.2881	855.0	0.3884	0.6203	1674	1284.9
15.726	6.359	473.5	0.0828	652.0	0.2216	897.6	0.4189	1023.4	0.5441	0.8428	1584	1402.2
16.770	5.963	634.4	0.2165	816.7	0.3555	1067.5	0.5836	1195.7	0.6959	0.9856	1494	1521.8
17.960	5.568	802.2	0.3732	988.9	0.5409	1244.5	0.7755	1375.6	0.8959	1.155	1403	1646.1
19.301	5.181	973.8	0.5537	1164.0	0.7367	1425.5	0.9900	1559.5	1.128	1.347	1315	1774.7
20.855	4.795	1151.9	0.7664	1346.2	0.9664	1613.5	1.250	1750.3	1.301	1.431	1226	1902.7
22.660	4.413	1336.2	1.015	1534.8	1.240	1808.0	1.553	1947.6	1.715	1.828	1137	2044.8
24.801	4.032	1519.3	1.306	1721.4	1.548	1998.1	1.896	2140.0	2.075	2.118	1047	2173.6
25.044	3.993	1530.9	1.329	1732.1	1.576	2007.6	1.922	2148.9	2.101	2.139	1041	2188.2
25.278	3.956	1552.1	1.365	1753.8	1.616	2031.0	1.967	2172.9	2.149	2.169	1031	2196.6
25.517	3.919	1568.8	1.395	1770.8	1.648	2047.6	2.013	2189.5	2.185	2.206	1024	2206.6
25.760	3.882	1588.0	1.430	1788.9	1.680	2065.1	2.037	2206.6	2.225	2.235	1015	2217.3
26.021	3.843	1608.2	1.465	1810.7	1.723	2089.2	2.086	2231.7	2.274	2.278	1006	2236.2
26.274	3.806	1627.6	1.505	1830.5	1.764	2109.6	2.127	2252.4	2.319	2.296	997	2240.2
26.532	3.769	1636.8	1.525	1838.8	1.786	2116.6	2.152	2258.8	2.343	2.330	988	2250.2
26.802	3.731	1646.5	1.549	1847.7	1.812	2124.4	2.180	2266.0	2.321	2.353	979	2251.1
27.078	3.693	1666.7	1.588	1868.2	1.852	2145.4	2.228	2287.2	2.412	2.388	970	2265.8
27.352	3.656	1677.2	1.614	1878.0	1.887	2154.1	2.257	2295.4	2.454	2.409	962	2268.5
27.632	3.619	1696.5	1.652	1897.7	1.922	2174.3	2.301	2315.9	2.499	2.474	953	2282.4
27.917	3.582	1716.1	1.692	1918.3	1.966	2195.1	2.351	2337.0	2.550	2.492	944	2297.1
28.209	3.545	1733.7	1.732	1935.7	2.011	2213.6	2.388	2355.8	2.598	2.561	935	2309.4
28.514	3.507	1755.7	1.775	1958.3	2.051	2236.9	2.448	2379.5	2.651	2.573	926	2326.4
28.827	3.469	1775.8	1.816	1978.8	2.102	2258.0	2.497	2401.0	2.707	2.617	917	2341.3
29.137	3.432	1795.8	1.861	1999.4	2.148	2279.4	2.549	2422.6	2.764	2.665	910	2357.7
29.455	3.395	1804.7	1.906	2007.4	2.178	2286.0	2.582	2428.7	2.799	2.686	899	2365.1
29.771	3.359	1824.4	1.925	2027.5	2.223	2306.8	2.635	2449.8	2.848	2.731	891	2371.6
30.120	3.320	1845.5	1.981	2049.6	2.279	2329.1	2.695	2472.3	2.906	2.781	881	2386.6
30.460	3.283	1865.1	2.025	2069.1	2.325	2349.7	2.749	2493.3	2.966	2.826	872	2401.0
34.305	2.915	2070.3	2.521	2279.1	2.907	2566.3	3.386	2713.4	3.640	3.367	781	2552.6
39.246	2.549	2265.7	3.215	2476.8	3.607	2767.0	4.163	2915.6	4.455	4.013	694	2689.1
45.766	2.185	2475.0	4.082	2690.3	4.567	2986.3	5.228	3137.9	5.573	4.919	605	2840.9
54.824	1.824	2647.9	5.746	2864.6	5.786	3162.8	6.672	3315.3	6.448	6.008	516	2950.0
70.126	1.466	2873.9	7.039	3094.8	7.721	3398.7	8.736	3554.3	9.262	7.819	428	3115.7

*Note—These tables are calculated from exterpolated values of specific heats, and therefore can only be regarded as sufficiently accurate for works engineers.
†Air Supply—10.478 lb. per 1 lb. of standard coal of 12,600 B.t.u. per 1 lb. entering at 60 deg. F.; clinkering temperature assumed to be 2,500 deg. F.

TABLE III.* SHOWING THE NUMBER OF POUNDS OF STEAM AT 150 LB. GAGE PRESSURE PER SQ. IN. PRODUCIBLE PER 1 LB. OF CLINKER PRODUCED WHEN THE SLURRY MOISTURE IS RETAINED CONSTANT AT 20%, BUT THE ENTERING AIR IS PREHEATED TO VARIOUS DEGREES BY THE OUTGOING CLINKER†

Clinker production		Entering combustion. Air preheated to 100 deg. F.		Entering combustion. Air preheated to 400 deg. F.		Entering combustion. Air preheated to 800 deg. F.		Entering combustion. Air preheated to 1,000 deg. F.		Entering air at maximum temperature to which it can be preheated by outgoing clinker		
Tons of coal per 100 tons of clinker	Lb. of clinker per 1 lb. of standard coal	Exit temperature of kiln gases	Lb. steam producible per 1 lb. of clinker	Exit temperature of kiln gases	Lb. steam producible per 1 lb. of clinker	Exit temperature of kiln gases	Lb. steam producible per 1 lb. of clinker	Exit temperature of kiln gases	Lb. steam producible per 1 lb. of clinker	Lb. steam producible per 1 lb. of clinker	Temperature of entering combustion air	Exit temperature of kiln gases
(1)	(2)	(3) deg. F.	(4)	(5) deg. F.	(6)	(7) deg. F.	(8)	(9) deg. F.	(10)	(11)	(12) deg. F.	(13) deg. F.
11.893	8.408	Corresponding to entering air at 100 deg. F.		.....	.....	.....	.....	.....	.....	.....	2039	338.0
12.525	7.984	.....	.....	.....	.....	.....	.....	.....	.....	.....	1944	457.0
13.210	7.570	.....	.....	.....	.....	.....	.....	.....	.....	.....	1853	574.0
13.957	7.165	.....	.....	.....	.....	.....	.....	.....	.....	0.2690	1704	687.8
14.791	6.761	.....	.....	.....	.....	.....	.....	427.0	0.0519	0.3255	1674	796.5
15.726	6.359	.....	.....	.....	.....	477.8	0.2405	586.5	0.1965	0.4792	1584	913.8
16.770	5.963	.....	.....	423.3	0.0573	641.3	0.2544	752.7	0.3565	0.6358	1494	1036.1
17.960	5.568	426.4	0.0572	589.7	0.2155	813.2	0.4361	927.9	0.5519	0.7965	1403	1164.5
19.301	5.181	594.0	0.2293	761.4	0.4011	991.5	0.6458	1109.4	0.7490	0.9803	1315	1298.8
20.855	4.795	770.1	0.4310	942.2	0.6124	1179.0	0.8909	1300.1	1.031	1.2117	1226	1455.4
22.660	4.413	954.8	0.6723	1131.9	0.8840	1375.5	1.182	1500.2	1.337	1.447	1137	1586.9
24.801	4.032	1144.1	0.9538	1325.3	1.1819	1574.5	1.5205	1702.1	1.692	1.731	1047	1732.2
25.044	3.993	1159.0	0.9806	1340.1	1.217	1588.1	1.548	1715.3	1.722	1.733	1041	1741.7
25.278	3.956	1180.1	1.013	1361.6	1.253	1611.2	1.5899	1739.1	1.765	1.795	1031	1760.4
25.517	3.919	1198.5	1.0458	1380.7	1.300	1630.2	1.606	1758.1	1.805	1.828	1024	1773.5
25.760	3.882	1218.2	1.0783	1400.5	1.324	1651.1	1.6659	1779.4	1.844	1.858	1015	1789.0
26.021	3.843	1238.8	1.113	1421.6	1.376	1673.0	1.710	1801.7	1.891	1.896	1006	1805.7
26.274	3.806	1258.5	1.1483	1441.8	1.398	1693.9	1.7456	1822.9	1.932	1.930	997	1820.9
26.532	3.769	1272.0	1.1763	1454.6	1.423	1705.8	1.778	1834.4	1.965	1.954	988	1826.9
26.802	3.731	1284.7	1.2006	1466.9	1.452	1717.4	1.808	1845.6	1.994	1.972	979	1832.2
27.078	3.693	1307.3	1.2384	1489.9	1.496	1741.1	1.856	1869.7	2.042	2.011	970	1850.3
27.352	3.656	1319.6	1.267	1501.6	1.522	1752.1	1.886	1880.3	2.071	2.034	962	1855.8
27.632	3.619	1339.7	1.3003	1522.3	1.563	1773.4	1.928	1901.8	2.120	2.073	953	1871.4
27.917	3.582	1360.0	1.342	1543.6	1.606	1795.1	1.978	1924.1	2.170	2.116	944	1887.7
28.209	3.545	1377.4	1.357	1561.0	1.650	1813.5	2.019	1942.7	2.210	2.157	935	1900.6
28.514	3.507	1401.3	1.422	1585.6	1.700	1839.0	2.072	1968.8	2.271	2.197	926	1920.3
28.827	3.469	1422.6	1.466	1607.4	1.738	1861.7	2.123	1991.8	2.323	2.240	917	1937.5
29.137	3.432	1433.0	1.506	1628.4	1.784	1883.4	2.173	2014.0	2.375	2.283	910	1955.0
29.455	3.395	1456.1	1.537	1640.9	1.817	1895.0	2.208	2025.2	2.415	2.307	899	1959.0
29.771	3.359	1476.8	1.574	1662.1	1.861	1917.2	2.254	2047.7	2.468	2.350	891	1976.2
30.120	3.320	1498.5	1.626	1685.0	1.914	1940.2	2.315	2071.1	2.525	2.398	881	1992.8
30.460	3.283	1520.0	1.673	1706.5	1.997	1963.1	2.369	2094.4	2.584	2.447	877	2010.0
34.305	2.915	1737.4	2.194	1929.8	2.534	2194.5	3.108	2330.0	3.557	2.976	781	2181.8
39.246	2.549	1954.9	2.673	2151.1	3.326	2421.1	3.777	2559.3	4.058	3.624	694	2348.6
45.766	2.185	2187.6	3.517	2389.5	4.800	2667.2	4.832	2809.3	5.176	4.510	605	2530.8
54.824	1.824	2390.1	4.828	2595.0	5.843	2876.8	6.162	3021.1	6.569	5.646	516	2675.7
70.126	1.466	2650.5	6.581	2861.5	7.35	3151.7	8.319	3299.9	8.846	7.408	428	2881.4

TABLE IV.* CONDITIONS SAME AS ABOVE EXCEPT THE SLURRY MOISTURE IS RETAINED CONSTANT AT 30%

11.893	8.408	.....	.....	.....	.....	.....	.....	.....	.....	.....	2039	.....
12.525	7.984	.....	.....	.....	.....	.....	.....	.....	.....	.....	1944	.....
13.210	7.570	.....	.....	.....	.....	.....	.....	.....	.....	.....	1853	.....
13.957	7.165	.....	.....	.....	.....	.....	.....	.....	.....	.....	1764	.....
14.791	6.761	.....	.....	.....	.....	.....	.....	.....	.....	.....	1674	.....
15.726	6.359	.....	.....	.....	.....	.....	.....	.....	.....	0.08897	1584	452.2
16.770	5.963	.....	.....	.....	.....	.....	.....	.....	.....	0.2210	1494	571.7
17.960	5.568	.....	.....	.....	.....	395.9	0.0370	494.6	0.1426	0.3644	1403	658.4
19.301	5.181	.....	.....	366.6	0.01129	565.6	0.2310	662.2	0.3435	0.5460	1315	832.3
20.855	4.795	396.6	0.03692	544.4	0.2146	751.1	0.4681	856.9	0.6216	0.7743	1226	992.6
22.660	4.413	570.6	0.2592	726.2	0.4591	960.5	0.6198	1070.1	0.8867	1.020	1137	1146.1
24.801	4.032	760.4	0.5312	920.7	0.7659	1141.3	1.070	1254.2	1.235	1.236	1047	1280.9
25.044	3.993	778.0	0.5596	938.0	0.7845	1158.1	1.101	1270.8	1.266	1.299	1041	1294.2
25.278	3.956	799.5	0.5739	950.6	0.8203	1179.9	1.142	1290.5	1.308	1.337	1031	1311.8
25.517	3.919	816.9	0.6209	978.1	0.8521	1199.9	1.176	1313.4	1.343	1.364	1024	1327.1
25.760	3.882	836.7	0.6533	998.6	0.8869	1221.2	1.215	1335.2	1.385	1.399	1015	1343.9
26.021	3.843	857.5	0.6877	1020.0	0.9224	1243.4	1.254	1357.8	1.427	1.432	1006	1361.4
26.274	3.806	877.3	0.7187	1040.4	0.9581	1264.6	1.295	1379.4	1.469	1.467	997	1377.6
26.532	3.769	894.9	0.7479	1059.8	0.9933	1283.8	1.323	1398.5	1.508	1.495	988	1391.6
26.802	3.731	917.4	0.7874	1079.8	1.036	1303.1	1.369	1417.5	1.545	1.529	979	1405.5
27.078	3.693	951.6	0.8121	1094.6	1.060	1317.4	1.401	1433.5	1.584	1.555	970	1416.1
27.352	3.656	947.0	0.8416	1109.7	1.089	1333.4	1.434	1448.0	1.615	1.573	962	1426.2
27.632	3.619	967.0	0.8781	1130.3	1.128	1354.9	1.479	1469.8	1.660	1.616	953	1442.6
27.917	3.582	987.8	0.9163	1152.1	1.170	1377.1	1.523	1492.5	1.708	1.655	944	1460.0
28.209	3.545	1004.7	0.9487	1169.0	1.205	1395.0	1.578	1510.7	1.753	1.688	935	1472.9
28.514	3.507	1030.2	0.9787	1195.3	1.252	1422.4	1.609	1538.5	1.809	1.735	926	1495.2
28.827	3.469	1051.4	1.034	1217.1	1.298	1445.1	1.666	1561.9	1.859	1.772	917	1509.5
29.137	3.432	1072.7	1.075	1239.2	1.341	1468.1	1.716	1585.2	1.909	1.823	910	1522.2
29.455	3.395	1088.7	1.109	1254.7	1.376	1483.1	1.752	1600.0	1.949	1.849	899	1540.5
29.771	3.359	1109.7	1.150	1276.3	1.420	1505.5	1.802	1622.8	2.002	1.892	891	1558.6
30.120	3.320	1132.2	1.195	1300.0	1.471	1529.6	1.857	1647.5	2.059	1.936	881	1577.0
30.460	3.283	1154.1	1.240	1322.0	1.517	1553.0	1.911	1671.2	2.117	1.983	872	1595.2
34.305	2.915	1379.8	1.749	1554.5	2.073	1794.8	2.525	1917.9	2.510	2.499	781	1783.4
39.246	2.549	1614.8	2.396	1794.9	2.767	2042.4	3.294	2169.2	3.568	3.106	694	1976.0
45.766	2.185	1867.0	3.263	2053.9	3.704	2311.0	4.329	2442.7	4.661	4.024	605	2184.8
54.824	1.824	2098.0	4.369	2289.5	4.900	2552.8	5.657	2687.6	6.046	5.107	516	2364.0
70.126	1.466	2225.2	5.608	2424.6	6.280	2698.9	6.933	2839.3	7.720	6.003	428	2443.4

*Note—These tables are calculated from exterpolated values of specific heats, and therefore can only be regarded as sufficiently accurate for works engineers.
†Air Supply—10.478 lb. per 1 lb. of standard coal of 12,600 B.t.u. per 1 lb. entering at 60 deg. F.; clinkering temperature assumed to be 2,500 deg. F.

TABLE V.* SHOWING THE NUMBER OF POUNDS OF STEAM AT 150 LB. GAGE PRESSURE PER SQ. IN. PRODUCIBLE PER 1 LB. OF CLINKER PRODUCED WHEN THE SLURRY MOISTURE IS RETAINED CONSTANT AT 40%, BUT THE ENTERING AIR IS PREHEATED TO VARIOUS DEGREES BY THE OUTGOING CLINKER†

Clinker production		Entering combustion. Air preheated to 100 deg. F.		Entering combustion. Air preheated to 400 deg. F.		Entering combustion. Air preheated to 800 deg. F.		Entering combustion. Air preheated to 1,000 deg. F.		Entering air at maximum temperature to which it can be preheated by outgoing clinker		
Tons of standard coal per 100 tons of clinker	Lb. of clinker per 1 lb. of standard coal	Exit temperature of kiln gases	Number of lb. steam producible per 1 lb. of clinker	Exit temperature of kiln gases	Number of lb. steam producible per 1 lb. of clinker	Exit temperature of kiln gases	Number of lb. steam producible per 1 lb. of clinker	Exit temperature of kiln gases	Number of lb. steam producible per 1 lb. of clinker	Number of lb. steam producible per 1 lb. of clinker	Temperature of entering combustion air	Exit temperature of kiln gases
(1)	(2)	(3) deg. F.	(4)	(5) deg. F.	(6)	(7) deg. F.	(8)	(9) deg. F.	(10)	(11)	(12) deg. F.	(13) deg. F.
11.893	8.408	.....	.....	.....	.....	.....	.....	.....	.....	.....	2039	.....
12.525	7.984	.....	.....	.....	.....	.....	.....	.....	.....	.....	1944	.....
13.210	7.570	.....	.....	.....	.....	.....	.....	.....	.....	.....	1853	.....
13.957	7.165	.....	.....	.....	.....	.....	.....	.....	.....	.....	1764	.....
14.791	6.761	.....	.....	.....	.....	.....	.....	.....	.....	.....	1674	.....
15.726	6.359	.....	.....	.....	.....	.....	.....	.....	.....	.....	1584	.....
16.770	5.963	.....	.....	.....	.....	.....	.....	Exit temp. corresponding to (13)		.....	1494‡	.....
17.960	5.568	.....	.....	.....	.....	Exit temp. corresponding to (11)				.....	1403	.....
19.301	5.181	Exit temp. corresponding to (4)		Exit temp. corresponding to (7)						0.0121	1315	374.8
20.855	4.795							408.9	0.0601	0.2234	1226	524.6
22.660	4.413					501.5	0.1988	595.4	0.3363	0.4344	1137	661.0
24.801	4.032	367.8	0.0030	506.9	0.2160	698.1	0.5153	796.0	0.6676	0.7048	1047	819.1
25.044	3.993	387.0	0.0324	526.0	0.2466	717.1	0.5456	814.9	0.7086	0.7339	1041	835.3
25.278	3.956	405.5	0.0615	545.3	0.2771	737.6	0.5802	836.6	0.7410	0.7655	1031	852.4
25.517	3.919	424.0	0.0898	564.2	0.3085	757.7	0.6163	856.4	0.7761	0.7949	1024	867.6
25.760	3.882	444.0	0.1216	584.8	0.3439	778.4	0.6512	877.6	0.8163	0.8266	1015	885.2
26.021	3.843	464.0	0.1538	605.5	0.3768	800.0	0.6888	899.6	0.8566	0.8613	1006	902.8
26.274	3.806	483.5	0.1863	625.5	0.4132	821.1	0.7273	921.1	0.8963	0.8945	997	919.5
26.532	3.769	501.7	0.2158	643.7	0.4446	838.9	0.7638	938.9	0.9307	0.9248	988	932.9
26.802	3.731	519.6	0.2463	661.4	0.4746	856.6	0.8006	956.5	0.9669	0.9550	979	946.0
27.078	3.693	541.3	0.2816	683.8	0.5131	879.8	0.8405	980.1	1.012	0.9857	970	965.0
27.352	3.656	558.6	0.3126	700.8	0.5456	896.8	0.8752	997.1	1.046	1.017	962	977.9
27.632	3.619	578.6	0.3443	721.6	0.5838	918.5	0.9131	1019.2	1.091	1.047	953	995.1
27.917	3.582	598.9	0.3822	742.6	0.6212	940.1	0.9528	1041.2	1.136	1.087	944	1012.9
28.209	3.545	619.2	0.4181	763.6	0.6615	962.1	0.9952	1063.7	1.183	1.125	935	1031.0
28.514	3.507	640.5	0.4573	785.6	0.7036	985.0	1.040	1087.0	1.231	1.163	926	1049.1
28.827	3.469	661.6	0.4959	807.4	0.7441	1008.0	1.087	1110.0	1.280	1.204	917	1068.0
29.137	3.432	682.8	0.5350	829.2	0.7877	1030.0	1.038	1134.0	1.327	1.246	910	1086.9
29.455	3.395	700.5	0.5686	847.0	0.8240	1048.0	1.183	1151.0	1.369	1.274	899	1099.0
29.771	3.359	721.7	0.6091	868.6	0.8672	1071.0	1.232	1174.0	1.419	1.316	891	1117.4
30.120	3.320	744.2	0.6552	891.7	0.9150	1095.0	1.284	1199.0	1.476	1.361	881	1136.5
30.460	3.283	766.0	0.6948	914.3	0.9616	1118.0	1.337	1223.0	1.531	1.406	872	1136.0
34.305	2.915	910.0	1.0135	1061.0	1.318	1270.0	1.736	1376.0	1.951	1.717	781	1260.0
39.246	2.549	1240.0	1.8218	1402.0	2.1808	1625.0	2.654	1739.0	2.946	2.546	694	1565.2
45.766	2.185	1506.0	2.672	1676.3	3.099	1910.0	3.537	2030.0	4.017	3.398	605	1795.4
54.824	1.824	1763.0	3.760	1939.0	4.275	2182.0	4.902	2304.0	5.377	4.475	516	2008.0
70.126	1.466	2088.0	5.512	2273.0	6.112	2524.0	7.014	2660.0	7.618	6.261	428	2291.0

*Note—These tables are calculated from exterpolated values of specific heats, and therefore can only be regarded as sufficiently accurate for works engineers.
†Air Supply—10.478 lb. per 1 lb. of standard coal of 12,600 B.t.u. per 1 lb. entering at 60 deg. F.; clinkering temperature assumed to be 2,500 deg. F.
‡Exit temperature corresponding to (14).

Consequently the number of pounds of steam producible will be

$$2723.756 \times 0.001159 = 3.157 \text{ lb.}$$

Hence for every 3.283 lb. of clinker produced we can obtain 3.157 lb. of steam, or for every 1 lb. of clinker we can obtain 0.616 lb. of steam.

This calculation has been repeated for various yields of clinker for kilns having fuel consumptions ranging from 11.893 to 70.126 tons* of standard coal per 100 tons* of clinker, and fed with slurries containing successively 0, 10, 20, 30 and 40% of water, and with the entering air preheated to 100 deg., 400 deg., 800 deg. and 1000 deg. F., and to the maximum temperature it could obtain if all the heat in the issuing clinker was imparted to the entering air.

The values of the pounds of steam producible under these circumstances are set forth in the tables herewith.

By interpolation from the results contained in these tables it is possible to calculate in a very simple manner the weight of steam producible under almost any other circumstances for any fuel consumption, slurry moisture and degree of preheating of the entering air.

The general method of interpolation was explained in the preceding part on exit temperatures.

Practical Results of the Tables

On surveying the tables the following facts become apparent:

(*a*) The more efficient the rotary kiln, the smaller the quantity of steam producible per 1 lb. of clinker.

(*b*) Assuming equal fuel consumptions, the amount of steam producible rapidly increases as we decrease the quantity of slurry moisture.

(*c*) Even in the most efficient modern rotary kilns using slurry moisture of 40% a very large amount of high-pressure steam is producible.

It is, therefore, thought that unless a radical change of design is introduced in almost any modern kiln, a waste-heat boiler is a proposition which will repay careful consideration from practical engineers.

If, however, a kiln is designed of such high efficiency as regards clinker production when fed with a slurry containing 40% moisture it burns only about 21 tons* of standard coal, the exit temperature will be so low that it will be impossible to attach a waste-heat boiler to a kiln.

(To be continued.)

*English ton of 2240 lb. To transpose to American tons multiply by 1.2.

Delay Blasting Case

COURT ACTION on complaints of damage from blasting at the Hudson County Stone Crushing Co. quarry in North Bergen, N. J., has been postponed for two weeks to give time to the George M. Brewster & Son, Inc., to meet with the complainants.

Prior to the opening of the court, Robert Bollinger, superintendent of the stone crushing plant, and Edward O'Neil, one of the superintendents, were arrested charged with maintaining a public nuisance.

Commissioner Buesser charged that company officials were aware of complaints made.

In postponing the case for two weeks, Recorder McCabe said that unless some arrangement is made whereby the severity of the vibrations from the blasts is cut down, he would order the arrest of the Brewster company officials and hold them for the grand jury.—*Jersey City* (N. J.) *Journal.*

Methods of Analysis of Portland Cement and Raw Materials from Which It Is Made

By Frank C. Moran

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THE METHODS of chemical analysis of portland cement and the raw mix as described below have been worked out by the writer and found quite satisfactory.

They are described in detail so that a new analyst may proceed without fear of neglecting things which might seriously affect the final results. A number of original procedures are also included which may be of value to experienced chemists.

Analysis of the Raw Mix

Weigh a ½-gm. sample and put into a platinum crucible. Add fusion mixture (1 to 1 Na_2CO_3 and K_2CO_3) until one-third full. Mix well with a spatula and top off the sample with more fusion mixture. Place in a muffle furnace at a temperature between 1300 and 1500 deg. F. for 5 min.

Remove from the muffle with platinum tip forceps and pour the contents on a copper slab. When crucible is cool wipe off the bottom and place in a 4-in. casserole.

Add 1 to 1 HCl to the crucible and cover quickly with a 4-in. watch glass. When effervescing ceases insert a glass rod into the crucible and tip over. If there is any fusion mixture on the side of the platinum ware, rotate it with a glass rod until the acid solution covers it.

Remove the watch glass and touch off, with the glass rod, any drops that have a tendency to drop off. Insert the rod into the crucible and wash off the outside; transfer to the hand and wash out the inside. Now add the button from the copper slab and cover with the same watch glass. When effervescing ceases, wash off the watch glass and the sides of the casserole. (Use as little water as possible in the above procedure.)

Place on a cool part of the hot plate and evaporate to dryness. If spitting occurs when near dry, stir with a glass rod.

When dry bake for 15 min., take off, cool and add 10 c.c. HCl and 50 c.c. distilled water. Boil for 2 or 3 min. and filter through a 11-cm. No. 40 Whatman paper into a 400-c.c. beaker. Wash with hot water five or six times. Put the wet filter paper in a 1½x1¼-in. unglazed annealing cup and place in the muffle while wet. When all carbon is burnt off remove the muffle, cool, weigh and multiply weight by 200 to get per cent. SiO_2.

Add NH_4OH to the filtrate until just ammoniacal, boil 2 or 3 min. with a watch glass over the beaker. Wash off the watch glass and let the beaker stand until cool enough to filter. Filter and wash through a 11-cm. No. 41 Whatman paper into an 800-c.c. beaker. (The funnel rack should be so cut that the funnel may be easily removed sidewise.) Now place the left small finger over the stem hole and grasp the rest of the stem with the other fingers. Wash the precipitate back into the original beaker and also wash the finger in contact with the stem.

Add 5 c.c. of concentrated HCl and stir the contents with a glass rod. Carefully add NH_4OH until ammoniacal, boil and filter as in the previous steps. Police the glass rod and beaker with the fingers. Wash the precipitate with hot water four times, being careful to stir up the apex of the funnel first and then spiral upward toward the edge of the paper with a jet of water.

Remove the paper and place in an annealing cup (same size as above mentioned), burn, cool, weigh and multiply the weight by 200 to report the per cent. R_2O_3 (aluminum and iron oxides).

Stir the filtrate from the R_2O_3 determinations with a glass rod; this is to prevent bumping on the hot plate. Boil the filtrate, with a watch glass cover over beaker, for 5 min. to get rid of the excess ammonia. At the same time warm up the saturated ammonium oxalate solution to near boiling. Being careful not to get burned with steam, add 25 c.c. of oxalate solution to the boiling lime solution (a beaker clamp and a test tube clamp to hold a graduate will greatly help at this stage of the procedure). Boil 3 to 5 min. to coagulate the precipitate. Remove from the hot plate and wash down the sides and watch glass. Leave the cover on the beaker until the solution clears. Filter through a 12.5-cm. No. 0 Sweed paper into an 800-c.c. beaker. Care should be taken when placing this paper in the funnel so that the edge will adhere firmly to the glass. This is to prevent any precipitate from crawling over the paper (the four-fluted fold paper is the easiest to wash and should be used in this determination). During filtration never fill the funnel more than three-quarters full and never wash to top edge of the paper. Wash five or six times with hot water, stirring up the precipitate well, and wash within ⅛ in. of top edge of paper.

Now with the finger bring the opposite side of the filter paper over on top of the adjacent side, pull out part way and spin the funnel, rubbing the side of the funnel at the same time. Take off about ¾ in. of the top edge of the paper and place on the top, inside of the beaker. The major portion of the precipitate and paper are dropped to the bottom of the beaker.

Add to a 250-c.c. beaker 15 c.c. of H_2SO_4, 1.3 specific gravity (375 c.c. H_2SO_4 to 625 c.c. H_2O) and dilute to 200 c.c. with water. Bring to a boil and add the contents to the lime oxalate beaker. Titrate with $KMnO_4$ solution. When the end point is reached push the reserved amount of filter paper into the solution and wash the sides down. Titrate to a faint pink color (5.634 gr. per 1 liter) and calculate the lime content (1 c.c. $KMnO_4$ equals 1% CaO).

To the lime filtrate add 25 c.c. NH_4OH and stir with a rubber-tipped glass rod. Now add 10 c.c. of saturated sodium ammonium phosphate solution, stir vigorously, rubbing the bottom of the beaker at the same time; cease stirring when the beaker clouds up good. Let stand for 2 or 3 hr. and filter all of the solution through a 12.5-cm. No. 42 Whatman filter paper (care should be exercised here to not fill the funnel more than three-quarters full). It is best to let the precipitate stand over night, then decant the excess liquid and filter. Wash the precipitate in both cases with a 1% NH_4OH solution. Put the filter paper in an annealing cup, burn, cool, weigh and multiply the weight by 0.724×100 to report per cent. MgO.

Clinker Analysis

Place a ½-gm. sample in a 3½-in. casserole and add 10 c.c. of 1 to 1 HCl, stir with a glass rod until all lumps are gone. Place on a pad at the edge of the stove and heat to dryness. When dry bake 15 min. Treat this sample the same as the raw rock sample, i.e., run for SiO_2, R_2O_3, CaO and MgO.

Cement Analysis

To run for SiO_2, R_2O_3, CaO and MgO treat the same as the clinker sample.

To run for sulphur weigh up a 1-gm. sample in a 150-c.c. beaker, add 25 c.c. of water, stirring up the sample at the same time. Then add 10 c.c. of HCl, cover with a watch glass and boil from 3 to 5 min. Filter through a 12.5-cm. Semecto paper into a 400-c.c. beaker and wash four or five times with hot water. Make ammoniacal and bring back just acid (2 to 3 c.c. excess HCl). Place on a hot plate. When a false boil occurs add 10 c.c. $BaCl_2$ solution (100 gm. $BaCl_2$ to 1 liter), cover with a watch glass and boil 5 min. Remove from hot plate, wash off the watch glass and the sides of the beaker and let stand for ½ hr. until cool (if a cold water cooling tray is available 10 to 15 min. cooling will be enough for the sample). Filter through a 12.5-cm. No. 42 Whatman paper. Wash four or five times with hot water and place in an annealing cup, burn immediately, cool, weigh and multiply the weight by 0.343×100 to record per cent. SO_3.

Ignition Loss on Raw Rock and Cement

Maintain a temperature around 1500 to 1600 deg. F. in the muffle. If one can weigh rapidly after ignition, weigh and record the weight of a platinum lid and weigh thereon a 1-gm. sample of raw rock or cement. Place in a muffle for ½ hr., remove and place on an iron block with an inverted beaker as a cover. Weigh the cover and sample as soon as the bottom of the lid can be brushed off on the back of a finger. Multiply the loss by 100 to get per cent. ignition loss. If one weighs slowly it would be better to use a platinum crucible and lid. In this case leave the lid off during ignition and replace the cover after removing from the muffle. The sample rapidly takes on water after ignition, so precaution is necessary.

Ignition Loss for Gypsum

For Determining Per Cent. Pure Gypsum and Per Cent. $CaCO_3$. Place a 1-gm. sample of gypsum on a weighed platinum crucible lid and place in muffle at 800 deg. F. for 1 hr. Take out and cool on an iron block with an inverted 50-c.c. beaker cover. Weigh as rapidly as possible. Loss of weight times 100 divided by 20.9 equals per cent. pure gypsum. The same sample and lid are placed in the muffle for 15 min. at a temperature between 1200 and 1300 deg. F. for 15 min. Remove, cool on an iron block and weigh as soon as possible. The difference between the first weight and this weight times 100 divided by 44 equals per cent. $CaCO_3$.

Gypsum Analysis

R_2O_3 Plus Insoluble. Place a ½-gm. sample in a 150-c.c. beaker and add 10 c.c. of 1 to 1 HCl solution. Put on a pad on a cooler part of the stove and take down to dryness. Bake 15 min., cool, add 10 c.c. of HCl and dilute up to 100 c.c. with water. Cover with a watch glass and boil 5 min. Remove, wash off the watch glass and add one or more drops of methyl orange indicator. Let cool slightly and add NH_4OH carefully until ammoniacal. Re-cover with watch glass and boil 2 or 3 min., remove from the plate and filter through a 11-cm. No. 41 Whatman paper. Redissolve and reprecipitate as in the former procedure for raw rock and clinker. Burn the paper in an annealing cup, cool, weigh and multiply the weight by 200 to report per cent. R_2O_3 plus insoluble. If insoluble is wanted separately from R_2O_3, filter the insoluble through a No. 40 Whatman 11-cm. paper and treat the same as in the former procedures.

Limestone

R_2O_3 Plus Insoluble, CaO and MgO, also report $CaCO_3$ and $MgCO_3$. Take ½-gm. sample and make a fusion in the ordinary manner. Redissolve in a 4-in. casserole and treat the same as the raw mix. After the sample is boiled and before filtering off the SiO_2, remove from the hot plate and add one or two drops of methyl orange, let cool slightly and make ammoniacal in the casserole. From here on the treatment is the same as with the raw mix.

Fe_2O_3 on Raw Rock, Clinker, Cement and Quarry Samples. After weighing up R_2O_3 and recording the weight, transfer the sample to a platinum crucible. Add sodium bisulphite until one-third full and place in a muffle, leaving the door open (temperature about 1500 deg. F.). Leave in this manner for 10 min. Close the muffle door for 10 min. more occasionally opening the door to let the SO_2 fumes escape. Remove the crucible, cool, wipe off the bottom and place in a 250-c.c. beaker. Add 25 c.c. dilute H_2SO_4 (1.3 sp. gr.) and place on a warm part of the hot plate until the salt is dissolved. Insert a glass rod into the crucible and lift out, wash off the outside and inside, boil the solution 2 or 3 min. with a watch glass on, wash the contents into a 250-c.c. flask. Add 3 gr. zinc and cover with a rubber cork that has a glass tubing protruding through the center of it. (A rubber hose with a cut on the side is placed on top of the glass tubing and at the other end of the rubber tube is a short glass rod.) When the sample ceases effervescing and is cool, wash the rubber cork and the sides of the flask. Titrate with $KMnO_4$ solution. One can use the $KMnO_4$ solution used for CaO determination. Multiply the titration cubic centimeters by 2×1.4298 on a 0.5-gm. charge to give per cent. Fe_2O_3. It would be better to make up a permanganate solution of 1.9733 gm. of $KMnO_4$ to 1 liter, then 1 c.c. equals 1% Fe_2O_3 when a 0.5-gm. charge is used. Subtract Fe_2O_3 from R_2O_3 to get per cent. Al_2O_3.

Standardizing Solutions

Permanganate for CaO Determination. Weigh 5.643 gm. of $KMnO_4$ for each liter of solution required. Dilute to the required volume and agitate with air for 15 min. Use a cleaned compressed air feed or a water vacuum pump to aerate the solution.

Weigh two or three samples of 0.5982 gr. C.P., sodium oxalate, $Na_2C_2O_4$, into a 400-c.c. beaker. In separate 250-c.c. beakers add 15 c.c. of 1.3 sp. gr. H_2SO_4, dilute to 200 c.c. and heat to boiling. Add this hot solution to the oxalate salt and titrate with the permanganate solution just made as above.

The titration should be 50 c.c., equivalent to 50% CaO. If it does not titrate 50 c.c., correct permanganate solution until it does.

EXAMPLE I

49.6 c.c. equals permanganate solution required for titration.

50 c.c. minus 49.6 c.c. equals 0.4 c.c. less permanganate solution required than there should have been.

19,000 c.c. equals the total amount of $KMnO_4$ solution.

107.02 gm. $KMnO_4$ crystals in solution.

The $KMnO_4$ solution is too strong.

Therefore, let X equal the amount of water which should be added to the permanganate solution to make it the proper strength. Then, $X : 0.4 :: 19{,}000 : 49.6$ equals 153.2 c.c. water required to add to the permanganate solution.

There is a small amount of $KMnO_4$ used in titrating that will not be there when calculating.

EXAMPLE II

50.4 c.c. equals permanganate solution required for titration.

50.4 c.c. minus 50.0 c.c. equals 0.4 c.c. more permanganate solution required than there should have been.

19,000 c.c. equals the total amount of $KMnO_4$ solution.

107.02 gm. $KMnO_4$ crystals in solution.

The $KMnO_4$ solution is too weak.

Therefore, let X equal the amount of $KMnO_4$ crystals to be added. Then, $X : 0.4 :: 107.02 : 50.4$ equals 0.849 gr. $KMnO_4$. Add 0.849 gr. $KMnO_4$ and agitate the solution 1 hr. Again check this solution against the $Na_2C_2O_4$ of a 50% CaO strength.

Sometimes one will unfortunately overtitrate a CaO determination. If this happens, weigh up 0.1196 gr. of $Na_2C_2O_4$ and add to the over-titrated beaker and continue titrating. This weight of salt is equivalent to 10% CaO. A better scheme would be to add 11.96 gr. $Na_2C_2O_4$ to a standard 1-liter flask and add distilled water to the mark. Transfer to a ground glass stoppered bottle and pipette 10 c.c. when needed.

Permanganate for Fe_2O_3 Determination. Weigh 1.978 gr. $KMnO_4$ per liter of water. Dissolve and agitate as with permanganate for lime determination. Dissolve 0.03496 gr. Fe or 0.2455 gr. of ferrous ammonium sulphate, $FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$, in 10 c.c. of 1 to 1 HCl and heat.

After Fe has passed into solution add 15 to 20 c.c. H_2SO_4, 1.3 sp. gr., and heat to fuming. Cool, dilute and treat as in former method for Fe analysis; 0.03946 gr. of Fe should titrate 10 c.c. or 10% Fe_2O_3.

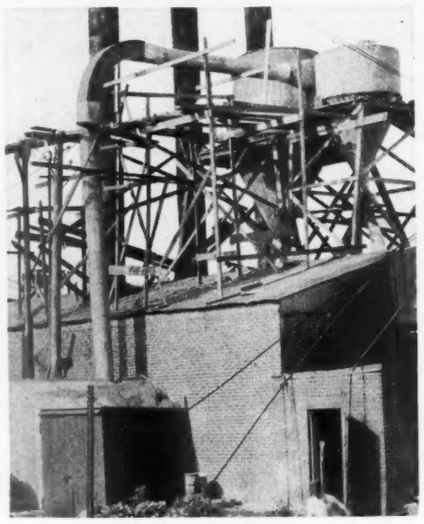
Hints and Helps for Superintendents

Long Radius Elbows

By H. M. Plaisted, M. E.
St. Louis, Mo.

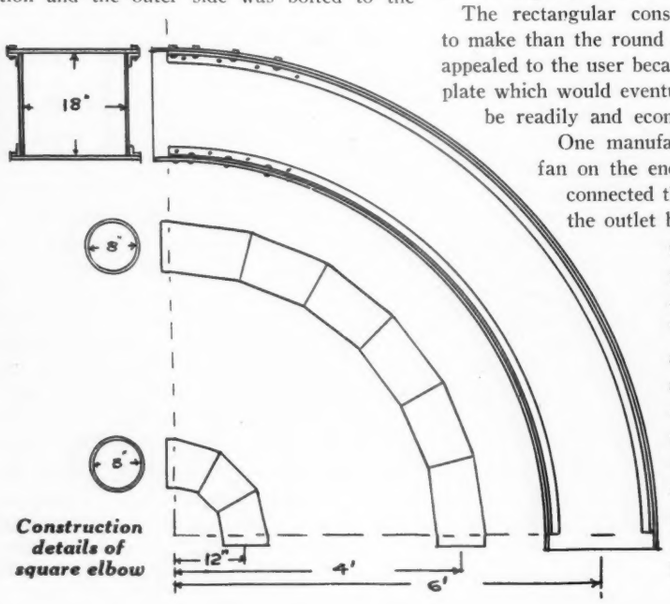
IN pressure and exhaust systems using sheet metal piping to carry the material from the grinding mill to the cyclone collector the use of short radius elbows results in an unnecessary loss in capacity and efficiency. Using elbows with a radius of 1½ times the diameter of the pipe not only handicaps the system but such elbows wear out under the impact of the material in its change of direction so that they require replacing before any other part of the system of piping. In one instance the high power required to operate a grist mill was found to be due to two things: the short radius elbows used in the installation and the form of rotary pivoted hammers used in the grist mill itself. The 8-in. pipe with its 90 deg. elbow on a radius of 12 in. was greatly improved by substituting an elbow with 4 ft. radius, and tests showed a reduction of 10% in the load on the motor.

In another installation a 20-in. pipe led vertically 25 ft. to a 90 deg. elbow of short radius leading to the cyclone collector. The hog fuel passing through the pipe soon reduced the elbow to paperlike thickness so that it had to be patched while a long radius elbow was ordered to replace it. Instead of making this new elbow of 20-in. diam. round pipe, it was made rectangular in cross section and the outer side was bolted to the corner angles so that it could be readily replaced when it eventually wore out. The accompanying sketch shows the simple construction. The radius was 72 in. instead of 30 in., as on the original elbow. In the square section each side was 18 in., making 324 sq. in. of cross section. This was a little more than the 314 sq. in. of the 20-in. diam. pipe, but the effective area was practically the same, due to the square corners in the long radius elbow.



An 18-in. square section of a 6-ft. radius elbow

The rectangular construction was easier to make than the round pipe elbow and also appealed to the user because the outer curved plate which would eventually wear out could be readily and economically placed.



Construction details of square elbow

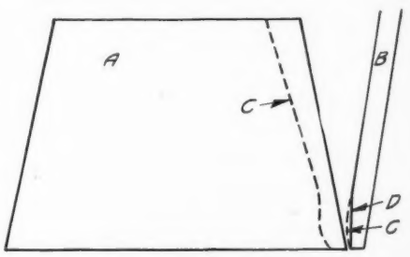
One manufacturer using a blast fan on the end of a crusher shaft connected the inlet of the fan to the outlet below the crusher by means of a curved pipe, making three-quarters of a circle. This machine, operating upon wet bark and veneer, filled the curved pipe completely full of shredded bark upon its first trial at full capacity.

For such damp and heavy stringy material a larger fan was necessary and at the same time the piping was changed from the three-quarter circle to a straight outlet pipe of barely 20-in. length from the crusher to the fan, which was installed and run as a separate unit. This direct connection from crusher to fan delivered the shredded bark and wet veneer on the shortest path to the fan, whence it was blown to the cyclone collector.

Changing Old Gyratory Crusher for Fine Grinding

By Ernest Moyer
Alturas, Calif.

ONE WAY in which a small gyratory crusher was arranged for fine grinding by installing a new manganese mantle and cutting away the concaves is shown in the accompanying illustration. In the sketch *C* indicates the line of the old head and also of the concaves, *B* is the old manganese concaves which were ground down as at *D* and reset. The new manganese mantle is shown at *A*. The crusher, which was a No. 2 size, was set to make a 1-in. product and the capacity was increased approximately 50% by the change. In order to use as large a head as possible the lugs on the back of the concaves were ground off so they could be set out to a larger circle. This left a 3-in. opening which was filled with a mild steel concave faced with a heavy layer of Stoody metal.

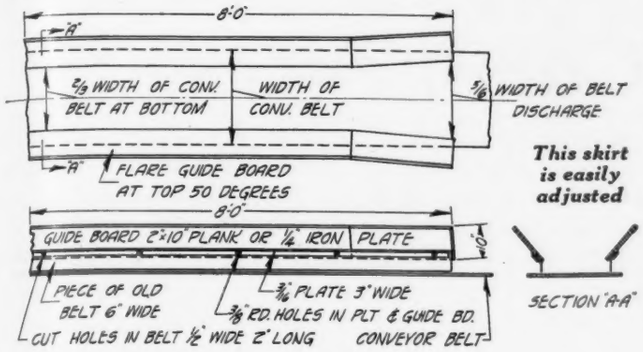


Showing changes to increase crusher capacity

Adjustable Skirts on Conveyor

By Dare Paris
Monrovia, Calif.

THE ACCOMPANYING SKETCH shows the use of adjustable skirts on guide boards at the feed end of a conveyor



belt, which can be adjusted while in operation. This we have found to be an advantage over the old way of nailing them on. The guide boards should be 2x10-in. planks or ¼-x10-in. plate iron. They extend from 6 to 8 ft. along the length of the belt and from 1- to 1½-in. above the surface of the belt. The distance at the bottom should not exceed two-thirds the width of the belt and flare out at the top to about 50 deg. The skirt boards shown in Fig. 1 should flare out at the discharge end five-sixths of the width of belt to allow the material to spread gradually upon the belt.

Fig. 2 shows the most practical way of applying skirts to guide boards. The sketch shows 3/16-x3-in. plate iron placed the length of the skirt. The skirt is inserted between the plate iron and guide board, the plate iron being used to hold skirt in place and take care of wear. Round ⅜-in. holes in the guide board and plate iron are placed 18 in. apart. In the belting cut holes ½-in. wide and 2-in. long. All that is necessary to lower the skirts is loosen the bolts and the skirt will drop in place. This can be done while the belt is running with no trouble and in a short time.

A Unique Transportation System

WHILE A SMALL SKIFF is a handy thing to have around a dredging operation, it is not always the handiest and best means of traveling between the shore and the dredge, at least the operators at the Roquemore Gravel Co., Montgomery, Ala., have found that the use of one of the extra dredge pipe pontoons makes an excellent means of transportation and for most work prefer it to the more conventional method. Oil barrels could be easily rigged up for such a float where a pontoon of the type illustrated is not available.

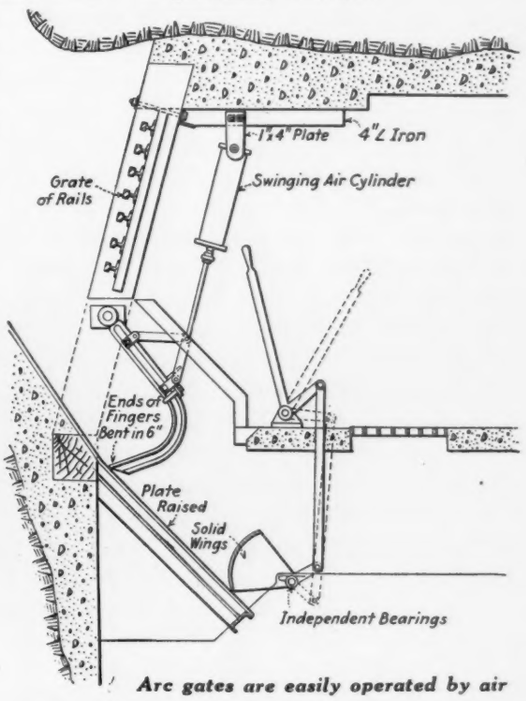
New form of hand-powered transportation

Air-Cylinders for Chute Gates

SINCE THE INTRODUCTION of compressed air, due to the air drill, as a source of power in mines, many of the heavy tasks of mining have been lightened by the development of air-operated machinery. Not only drills, but hoists, air-lift pumps, and locomotives are all doing their share. Of recent years air-cylinders have found an increasing use for such work as the operation of gates at the skip-loading stations, etc.

Realizing that air-cylinders are particularly applicable to operations involving an approximately straight-line motion, the United Verde Extension Mining Co., has tried, with success, the use of those cylinders for the opening and closing of arc gates in the chutes on the haulage level. Great effort is required to work these gates by keys or levers when done manually, and also the running ore is not efficiently regulated in loading the cars because of gates that jam. Not only are there many such gates in most mines but they must be opened and closed many times a day. The application of air-cylinders to this duty can be widespread yet it is not of sufficient importance to warrant a large expenditure for the manufacture or installation of the units.

This company makes the cylinders of standard materials and simple construction in their own shop so that the cost is comparatively little. A 5-in. bore with a stroke of 20 in. is a common unit. When installed over the chute gates lugs on opposite sides of the upper cylinder head are engaged in a plate bearing so that the cylinder is free to swing with any lateral movement of the gate as it opens or closes. The piston rod, projecting downward, is fastened by means of a bearing to the gate. The air valve is placed at a point convenient for the car loader. By making the installation as simple as possible the cost of making and using these cylinders is not excessive and they lighten immeasurably, as well as speed up, work of the loader.—*Mining and Metallurgy.*



Arc gates are easily operated by air

Daily "Safety First" Reminder

THE Thornton, Ill., plant of the Moulding-Brownell Co., formerly the Brownell Improvement Co., misses no opportunity to stress "Safety First" and its advantages to the employes. Posters, "danger" signs, monthly records of accidents, and other means are taken to impress the men.

A simple but effective means of bringing the thought of "Safety First" to the men before starting work and on leaving the plant, is an imprint on the time cards. Every time card has stamped on its back such slogans as "Safety First—Be Careful—Don't Get Hurt." This slogan is stamped on each card with a rubber stamp in red ink, and when the cards are in the time card rack the slogan shows above the holder.

As a means of bringing the thought of safety before workmen, as well as executives and visitors who pass through the timekeepers' office, this little kink seems to be particularly effective.

Editorial Comment

"Eternal Vigilance Is the Price of Success"

Occasionally a producer tells us: "I am too busy to read a trade paper. Anyhow I know all there is to know about this industry." We do not hear this so often as we once did. But we do know that many producers who regularly receive ROCK PRODUCTS do not make the use of it that they could. We know this because we editors are very, very frequently asked questions on a variety of subjects, the answers to which are all available in the files of published issues.

The functions of an experienced and conscientious editor of a business or industrial journal are many, but the prime one is unquestionably to help light the path of progress and development in his particular field. It is not enough to join the procession and report news and describe developments. He must so report news and describe developments that their real significance will be seen and appreciated. He may and often does attempt to interpret their significance. But in such interpretation, while he may have the advantage of a broad general outlook, he seldom can deal with local conditions or local problems to give his comments specific value; and not being infallible his interpretations may be faulty. A true and adequate report of events and developments, if read and absorbed, is the key to progressive thinking on the part of the reader—and no business today can long succeed without progressive thinking.

The article on another page of this issue on the mineral aggregate industry in Kansas City is a case in point. It emphasizes some of the economic changes that affect your (and every other producer's) business. Those changes may take place slowly or too insidiously for you actually to see them very clearly; but certainly a careful reading of current literature of the industry, and a little meditation and contemplation, would bring to mind some of these tendencies. It is relatively easy to study and analyze present conditions and describe the economic changes which brought them about. It is a case of hindsight being better than foresight. To foresee the changes impending and prepare for them is what is called for in successful business management.

For example, much emphasis is now being placed on the fact that increased railway freight rates have diverted and will divert the haulage of sand, gravel, stone and slag from the railways to motor trucks. The producer who built or has contemplated building a large capacity railway plant should have taken probable changes in freight rates into account. He also should have taken into account that every paved highway he was instrumental in constructing had the possibility of opening up a new source of competitive material. He should have considered the possibility and probability of better and cheaper motor trucks. He should have considered whether or not advances in material handling from railway cars to construction jobs were keeping up with competitive factors.

In other words, with every mile of paved road built, opening new avenues both for obtaining and delivering material; with every improvement in motor-truck design and operation; with every improvement in gravel plant design and operation, his large central railway plant was adversely affected. The increase in railway freight rates has been an important factor, but after all, only one of several factors. Even with the lowest possible freight rates much of this traffic would have been diverted to trucks with the increase in mileage of paved roads, and the avoidance of the inconveniences and the costs of unloading and reloading the material at railway sidings. Moreover it should have been apparent that every decrease in the price of his commodity, railway rates remaining unchanged, further handicapped his railway shipping plant.

The producer who did not foresee and provide for such contingencies can not wholly blame fate, or the railways, or anybody or anything other than his own want of foresight. He should have studied all these factors, general and specific, which would affect the economic life of his operation, and then should have conservatively priced his product so as to have liquidated his original investment and been prepared to change the character of his operations when and if it was evident they should be changed. Sometimes, it is true, it is very difficult to see what direction changing economic conditions are taking. We can be positive of only one thing: *that they are changing.* Consequently no one can ever know all there is to know about his industry or even his own business. Keeping intellectually abreast of developments and their significance is the price of success in any business.

It is the prime function of a business or industrial journal to stimulate thinking along such lines, and it is the editor's hope that the article on the Kansas City aggregate situation will be read with that in mind. Such an analysis should also prove of tangible help to the industry. Where it is possible to obtain all the facts as clearly and reliably as in this case, fewer promoters are likely to enter the field, and certainly bankers will be more hesitant about financing new projects without a most searching investigation.

Effort Needed to Insure Construction of Public Works

Two strong trends are being given much thought and publicity today. Each is of vital importance to this, the rock products industry. Properly directed and carried out, untold benefit will result to all producers who are economically justified as producers. Without proper direction great harm will result. Strongest of these trends at the present time and the one which may be expected to receive the greatest support is a growing demand for lower

taxes. This can only be accomplished in one way—by efficient public administration. The second trend, and one that is rapidly gaining in public support, is a movement to build *needed* public improvements now. Support to this movement has been given by national, state and local organizations, and the response has been noteworthy.

There are billions of dollars of projects that are being needlessly delayed which are sorely needed in their communities. Typical of such work is the projected $300,000,000 sewage disposal system for New York City, the first unit of which has only recently been started. The communities in which sanitary conditions are intolerable according to modern standard and possibilities are many and their improvement would provide a large and widely distributed volume of construction work. Many other instances could be cited to show the actual existence of projects that should be built and which would be instrumental in returning construction to normal levels.

If these trends are directed so that they are not incompatible—and that means if the contemplated construction work is economically sound—the greatest forward step in the development of America might quickly be realized.

That both objectives may be consummated is dependent upon one factor—that waste, inefficiency and dishonest administration of public funds be eliminated. Well directed effort by all those vitally interested in the welfare of the industry toward this goal will minimize the possibility of an overpowering, but inconsistent, public demand for lowered taxes and larger gifts of public funds for charitable purposes.

Important Developments in an Important Market

House construction has always been an important element in the rock products market. In recent years foundations, walks and auxiliary drives for such construction have consumed large quantities of cement and aggregates while plaster, masonry and stucco have been important markets for sand, lime, gypsum, magnesite and other products of the industry. For many years effort has been directed by various organizations and associations to increase this market by the promotion of firesafe house construction.

Various methods of construction have been developed, such as hollow masonry units, walls cast on the ground and raised in place as large units, and combinations of gypsum products, pre-cast and job-cast.

That this promotion has been productive is shown by a recent survey of construction in the cities of the northern half of the United States. In this survey it was found that, taking cities as a whole, frame buildings gained 26.5%, whereas non-frame or firesafe construction gained 73.4% during the past decade. The report, however, continued to say that the great numerical majority of buildings are still frame construction. The above figures are not accurately representative of the residential trend but they are indicative of definite progress in that field.

In the past the higher cost of firesafe construction has been a retarding factor in the rate of expansion of this method of building. Recent development of welded steel frame construction appears to have largely minimized this price difference. Comparative bids were recently taken on a house plan with the resulting bid of $6,720 for wood construction and $6,744 for welded steel frame construction. Masonry walls were included in the bid for the steel frame house and 2-in. reinforced concrete ceilings. Numerous combinations of firesafe wall and floor design might be economically adapted to this construction, some of which should further improve the character of the building as well.

Here, then, may be the solution of the most difficult problem encountered in the promotion of firesafe house construction. On an equal price basis none would choose the inflammable house with its more rapid depreciation and higher insurance cost and upkeep.

Here is an enormous market that has been increasing, even with a price handicap. How much more rapidly this increase may take place on an equal price basis and with the added impetus of the promotional efforts of the steel industry can scarcely be predicted. Outstanding progress should be made if sufficient attention is given its development.

And attention will be given it when the potential volume is realized. Instead of ½ in. of plaster on the walls as is used with wood frame construction there is in addition at least twelve times that thickness possible as masonry. In normal periods with 250,000 residences under construction each year over 5 million cubic yards of masonry would be required to supply this market. With 3- to 4-in. floors another 4 million cubic yards would be required. This is in addition to the materials now used for foundations, walks, drives, stucco, plaster, etc.

This market offers the possibility of approximately 9 million cubic yards of business that is now eliminated in volume by a price bugaboo. During the past four years home building has been looked upon as of minor consequence in the building industry. There is now strong likelihood of a change in sentiment in this. In November the President's Conference on Home Building and Home Ownership is to meet and discuss findings of fifteen months' study of the problem. Much publicity is being given this subject as a social problem.

With a wide public interest in the social benefits derived from home ownership, with economic conditions pointing to an early recovery in volume of home construction and with a related industry adding impetus to a demand that has increased under a heavy price differential through past promotional efforts of the rock products industry, now is the time to attack with renewed vigor this important market which science and invention have drawn nearer.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[27]	9-23-31	94	.....	
Alpha P. C. new com.[2]	9-19-31	11½	12½	25c qu. Oct.24
Alpha P. C. pfd.[2]	9-19-31	105	120	1.75 qu. Sept. 15
Amalgamated Phosphate Co. 6's, 1936[19]	9-19-31	95	100	
American Aggregates com.[19]	9-19-31	3	6	75c qu. Mar. 1
American Aggregates pfd.[19]	9-19-31	55	65	1.75 qu. July 1
Amer. Aggr. 6's, w.w.[19]	9-19-31	60⅛	65	
Amer. Aggr. 6's, ex-w.[19]	9-19-31	57	62	
American Brick Co., sand-lime brick	5- 4-31	.....	7	25c qu. Feb. 1, '30
American Brick Co. pfd.	5- 4-31	52¼	57	50c qu. May 1, '30
Am. L. & S. 1st 7's[27]	9-23-31	94	.....	
American Silica Corp. 6½'s[39]	9-23-31	No market		
Arundel Corp. new com.	9-18-31	29⅞ act. sale		75c qu. Oct. 1
Bessemer L. & C. Cl. A[4]	9-18-31	.....	15½	50c qu. Aug. 1
Bessemer L. & C. 1st 6½'s[4]	9-18-31	.....	63	
Bloomington Limestone 6's[27]	9-23-31	.....	25	
Boston S. & G. new com.[37]	9-18-31	7½	10	15c qu. July 1
Boston S. & G. new 7% pfd.[37]	9-18-31	36	39	87½c qu. July 1
California Art Tile A	9-19-31	.....	5	43¾c Mar. 31
California Art Tile B[40]	9- 3-31	2	3	20c qu. Mar. 31
Calaveras Cement com.[9]	9-17-31	.....	10	
Calaveras Cement 7% pfd.[9]	9-17-31	.....	70	1.75 qu. Oct. 15
Canada Cement com.	9-22-31	.....	5½	
Canada Cement pfd.	9-22-31	66 act. sale		1.62½ qu. Sept. 30
Canada Cement 5½'s	9- 8-31	99	100	
Canada Cr. St. Corp. bonds[34]	9- 4-31	93	97	
Canada Crushed Stone com.[42]	9- 4-31	3	6	
Canada Crushed Stone pfd.[41]	9-18-31	No market		
Certainteed Prod. com.	9-22-31	3	3⅛	
Certainteed Prod. pfd.	9-22-31	23	29	1.75 qu. Jan. 1
Cleveland Quarries	9-22-31	.....	55	75c qu. Sept. 1
Columbia S. & G. pfd.	9-22-31	85	92	
Consol. Cement 1st 6½'s, A[44]	9-23-31	No market		
Consol. Cement Notes, 1941[27]	9-23-31	.....	15	
Consol. Cement pfd.[27]	9-23-31	No market		
Consol. Oka S. & G. 6½'s[12] (Canada)	9-19-31	98	100	
Consol. Oka S. & G. pfd.[41] (Canada)	9- 8-31	.....	80	
Consol. Rock Prod. com.[9]	9-17-31	50c	75c	
Consol. Rock Prod. pfd.[9]	9-17-31	4½	5	43¾c qu.June1,'30
Consol. Rock Prod. units	9-21-31	3	5	
Consol. S. & G. pfd. (Can.)	9-22-31	.....	50	1.75 qu. Aug. 15
Construction Mat. com.	9-22-31	4	5	
Construction Mat. pfd.	9-22-31	12½	13	87½c qu. Aug. 1
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[35]	9-17-31	57½	63	
Coosa P. C. 1st 6's[27]	9-23-31	40	45	
Coplay Cem. Mfg. 1st 6's[33]	9-19-31	60	70	
Coplay Cem. Mfg. com.[33]	9-19-31	5	7½	
Coplay Cem. Mfg. pfd[33]	9-19-31	25	40	
Dolese & Shepard	9-22-31	27	29	$1 qu. Oct. 1
Dufferin Pav. & Cr. Stone pfd.	9-22-31	.....	65	1.75 qu. Oct. 1
Dufferin Pav. & Cr. Stone com.	9-22-31	6	.....	
Edison P. C. com.[32]	9- 3-31	1½	.....	
Edison P. C. pfd.[32]	9- 3-31	5	.....	
Federal P. C. 6½'s,1941[19]	9-19-31	90	100	
Giant P. C. com.[2]	9-19-31	2	4	
Giant P. C. pfd.[2]	9-19-31	12	17	1.75 s.-a. Dec. 15
Gyp. Lime & Alabastine, Ltd.	9-22-31	5	6	20c qu. June 30
Gyp. Lime & Alabastine 5½'s	9- 8-31	80	85	
Hermitage Cement com.[11]	9-19-31	15	25	
Hermitage Cement pfd.[11]	9-19-31	65	70	
Ideal Cement, new com.[29]	9-19-31	25	27	50c qu. & 50c ex. Oct. 1
Ideal Cement 5's, 1943[29]	9-19-31	98	101	
Illinois Electric Limestone 1st 7's[38]	9-18-31	.....	90	
Indiana Limestone units[27]	9-23-31	No market		
Indiana Limestone 6's	9-21-31	15	24	
International Cem. com.	9-22-31	21½	22	$1 qu. Sept. 30
International Cem. bonds 5's	9-22-31	75 act. sale		Semi-ann. int.
Kelley Is. L. & T. new stock	9-22-31	17½	20	50c qu. Oct. 1
Ky. Cons. St. V. T. C.[38]	9-18-31	No market		
Ky. Cons. Stone 6½'s[38]	9-18-31	70	80	
Ky. Cons. Stone com.[38]	9-18-31	3	5	
Ky. Cons. Stone pfd.[38]	9-18-31	60	70	1.75 qu. May 1
Ky. Rock Asphalt com.	9-22-31	3½	4¼	40c qu. Oct. 1, '30
Ky. Rock Asphalt pfd.	9-22-31	.....	60	1.75 qu. Sept. 1
Ky. Rock Asphalt 6½'s	9-22-31	84½	88	
Lawrence P. C.	9-21-31	36	41	$1 qu. June 30
Lawrence P. C. 5½'s, 1942[2]	9-19-31	75	80	
Lehigh P. C.	9-22-31	8	9	25c qu. May 1
Lehigh P. C. pfd.	9-22-31	83¼	90	1.75 qu. Oct. 1
Louisville Cement[7]	9-18-31	125	150	
Lyman-Richey 1st 6's, 1932[13]	9- 4-31	95	.....	
Lyman-Richey 1st 6's, 1935[13]	9- 4-31	92	.....	
Marblehead Lime 6's[14]	9-18-31	No market		
Marbelite Corp. com.[33] (cement products)	9-17-31	.....	1	
Marbelite Corp. pfd.	9-16-31	1	.....	50c qu. Oct. 10, '30
Material Service Corp.	9-22-31	15¼	17	50c qu. June 1
McCrady-Rodgers 7% pfd.[22]	9-18-31	40	.....	87½c qu. June 30
McCrady-Rodgers com.[22]	9-18-31	15	20	75c qu. Jan. 26
Medusa Portland Cement	9-22-31	.....	30	75c qu. Apr. 1
Michigan L. & C. com.[6]	9-19-31	45	.....	
Missouri P. C.	9-22-31	19½	20	50c qu. July 31
Monolith Portland Midwest[9]	9-17-31	1	2	
Monolith P. C. com.[9]	9-17-31	1¾	2¼	40c s.-a. Jan. 1
Monolith P. C. pfd.[9]	9-17-31	3¾	4¼	40c s.-a. Jan. 1
Monolith P. C. units[9]	9-17-31	9¼	10¾	
Monolith P. C. 1st Mtg. 6's[9]	9-17-31	73	77	
National Cem. (Can.) 1st 7's[27]	9-23-31	98	.....	
National Gypsum A com.	9-16-31	3¼	3¾	
National Gypsum pfd.	9-16-31	43	46	1.75 Oct. 1
Nazareth Cement com.[25]	9-19-31	.....	10	
Nazareth Cement pfd.[25]	9-19-31	.....	85	
Newaygo P. C. 1st 6½'s[27]	9-23-31	80	90	
New England Lime 6's, 1935[19]	9-19-31	20	50	
N. Y. Trap Rock 1st 6's	9-22-31	83	84	
N. Y. Trap Rock 7% pfd.[30]	9-22-31	95	.....	1.75 qu. July 1
North Amer. Cem. 1st 6½'s	9-22-31	34 actual sale		
North Amer. Cem. com.[27]	9-23-31	1	2	
North Amer. Cem. 7% pfd.[27]	9-23-31	7	10	
North Amer. Cement units	9-23-31	No market		
North Shore Mat. 1st 5's[15]	9-23-31	80	.....	
Northwestern States P. C.[21]	9-19-31	80	83	$2 Apr. 1
Ohio River S. & G. com.	9-22-31	.....	14	
Ohio River S. & G. 7% pfd.	9-22-31	.....	98	
Ohio River S. & G. 6's[16]	9-19-31	80	90	
Oregon P. C. com.[9]	9-17-31	8	12	
Oregon P. C. pfd.[9]	9-17-31	80	85	
Pacific Coast Aggr. com.[40]	9- 3-31	.....	1	
Pacific Coast Aggr. pfd.	9-21-31	.....	1½	
Pacific Coast Cement 6's[5]	9-17-31	80	.....	
Pacific P. C. com.	9-19-31	.....	12	
Pacific P. C. pfd.	9-19-31	.....	65	1.62½ qu. July 3
Pacific P. C. 6's[5]	9-17-31	98	.....	
Peerless Cement com.[21]	9-21-31	.....	2	
Peerless Cement pfd.[21]	9-21-31	.....	35	1.75 qu. Apr. 1
Penn.-Dixie Cement com.	9-22-31	1¼	1½	
Penn.-Dixie Cement pfd.	9-22-31	7	10	
Penn.-Dixie Cement 6's	9-22-31	51½	52	
Penn. Glass Sand Corp. 6's	9- 3-31	98	101	
Penn. Glass Sand Corp. pfd.	7- 8-31	90	.....	1.75 qu. Oct. 1
Petoskey P. C.	9-22-31	3½	5	15c qu. Apr. 1
Port Stockton Cem. com.[9]	9-17-31	No market		
Riverside Cement com.	9-19-31	.....	9	
Riverside Cement pfd.[9]	9-17-31	55	60	1.50 qu. Aug. 1
Riverside Cement, A[5]	9-17-31	5	10	15c qu. Feb. 1
Riverside Cement, B[9]	9-17-31	1	2	
Roquemore Gravel 6½'s[17]	9-18-31	98	100	
Sandusky Cement 6½'s, 1931-37[19]	9-19-31	97	99	
Santa Cruz P. C. com.	9-19-31	84	.....	$1 qu. Oct. 1
Schumacher Wallboard com.	9-19-31	.....	11	25c qu. June 27
Schumacher Wallboard pfd.	9-19-31	.....	22	50c qu. Nov. 15
Southwestern P. C. units[35]	9-17-31	225	250	
Standard Paving & Mat. (Canada) com.	9-22-31	.....	4	50c qu. May 15
Standard Paving & Mat. pfd.	9-22-31	.....	60	1.75 qu. Aug. 15
Superior P. C., A	9-19-31	37	39	27½c mo. Oct. 1
Superior P. C., B	9-19-31	7¾	9	25c qu. Mar. 20
Trinity P. C. units[31]	9-19-31	95	103	
Trinity P. C. com.[31]	9-19-31	16	25	
Trinity P. C. pfd.[27]	9-23-31	80	.....	
U. S. Gypsum com.	9-22-31	23½	24	40c qu. Sept. 30
U. S. Gypsum pfd.	9-22-31	126½	130	1.75 qu. Sept. 30
Wabash P. C.[21]	9-21-31	.....	21	
Warner Co. com.[16]	9-19-31	20	20¾	25c qu. Oct. 15
Warner Co. 1st 7% pfd.[16]	9-19-31	90	95	1.75 qu. Oct. 1
Warner Co. 1st 6's[8]	9-24-31	70	76	
Whitehall Cem. Mfg. com.[30]	9-22-31	75	.....	
Whitehall Cem. Mfg. pfd.[30]	9-22-31	50	.....	
Wisconsin L. & C. 1st 6's[15]	9-23-31	80	.....	
Wolverine P. C. com.	9-22-31	1⅝	1⅞	15c qu. Nov. 15
Yosemite P. C., A com.[35]	9-17-31	1½	2	

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler, Beadling & Co., Youngstown, Ohio. [5]Smith, Camp & Riley, San Francisco, Calif. [6]Frederick H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hewitt, Ladin & Co., New York. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simonds & Co., Inc., Detroit, Mich. [22]Peoples-Pittsburgh Trust Co., Pittsburgh, Penn. [23]A. B. Leach & Co., Inc., Chicago, Ill. [24]Richards & Co., Philadelphia, Penn. [25]Hincks Bros. & Co., Bridgeport, Conn. [26]Bank of Republic, Chicago, Ill. [27]National City Co., Chicago, Ill. [28]Chicago Trust Co., Chicago, Ill. [29]Boettcher & Co., Denver, Colo. [30]Hanson and Hanson, New York. [31]S. F. Holzinger & Co., Milwaukee, Wis. [32]Tobey and Kirk, New York. [33]Steiner, Rouse and Co., New York. [34]Jones, Heward & Co., Montreal, Que. [35]Tenney, Williams & Co., Los Angeles, Calif. [36]Stein Bros. &Boyce, Baltimore, Md. [37]Wise, Hobbs & Arnold, Boston. [38]E. W. Hays & Co., Louisville, Ky. [39]Blythe Witter & Co., Chicago, Ill. [40]Martin Judge Co., San Francisco, Calif. [41]A. J. Pattison Jr. & Co. Ltd., Toronto, Canada. [42]Nesbitt, Thomson & Co., Montreal. [44]E. H. Rollins, Chicago. [45]Dunlap, Wakefield & Co., Louisville, Ky.

Canada Cement Co.'s Outlook Good

THE Canada Cement Co. has been affected only to a limited extent by the price cutting in the United States, says the *Wall Street Journal* (New York). The company does not suffer much from competition with imported products, because of the heavy expense in shipping cement any distance. Only at certain centers near the border has it been necessary to meet the low prices quoted by United States companies.

The company through various plant changes has improved its efficiency in recent years. This year, the Port Colborne plant is being converted to a wet process from a dry process, the last of the company's plants to be changed over to the cheaper and more efficient system of manufacture. The capacity of the Montreal East plant was increased to 15,000 bbl. daily from 10,000 by the change. The work at Port Colborne will cost about $500,000.

During the past four years the present company has been in operation, the management in following its policy of paying for plant improvements out of earnings has plowed back some $8,000,000 into property, thus increasing the equity behind the securities and avoiding an increase in fixed charges.

American Lime and Stone Co.'s Report

THE American Lime and Stone Co., Bellefonte, Penn., a subsidiary of the Warner Co., Philadelphia, Penn., reports for the year ended December 31, 1930:

	1930	1929
Net sales	$1,431,205	$1,358,805
Manufacturing, operating, general expense, etc.	1,105,939	1,059,195
Depreciation and depletion	168,763	140,872
Operating income	156,503	158,738
Other income	35,952	32,738
Total income	192,455	191,476
Interest	86,389	91,522
Surplus	$ 106,066	$ 99,954
Times interest earned	2.23	2.09
Earned per share, preferred	$15.15	$14.28

Number of preferred shares, 7000.

BALANCE SHEET AS OF DECEMBER 31

ASSETS

	1930	1929
*Land, buildings, etc.	$2,013,420	$2,250,137
Current assets:		
Inventories (net)	138,178	139,208
Receivables (net)	226,911	†210,243
Cash	48,891	28,161
Sinking fund cash	34,373	32,735
Compensation insurance fund	42,746	27,849
Deferred charges	127,974	119,575
Total	$2,632,494	$2,807,908

LIABILITIES

Preferred stock	$ 700,000	$ 700,000
Common stock	500,000	500,000
Bonded debt	1,071,000	1,139,500
Current liabilities:		
Accounts payable, etc.	32,048	31,818
Sundry reserves	18,463	13,984
Surplus and profits	310,983	422,606
Total	$2,632,494	$2,807,908
Current assets	$ 413,980	$ 377,612
Current liabilities	32,048	31,818
Working capital	$ 381,932	$ 345,794

*After depreciation to December 31: 1930, $998,493; 1929, $1,175,788. †Includes $125,000 demand loans.

Northwestern States Portland Cement Company Omits July Dividends

IN ANNOUNCING the decision of the directors of the Northwestern States Portland Cement Co. (Mason City, Ia.) to omit a dividend due July 1, President Hanford MacNider is quoted as follows:

"The cement industry, which has struggled through the last few years under the handicap of a seriously increasing overproduction, entered early this year into a ruinous price war, national in scope, which threatens to run unabated well into any future improvement of business conditions. The sales and shipments of our company have, comparatively speaking, been maintained at a satisfactory level. Our operating expenses have been reduced to a minimum, compatible with efficient operation and maintenance of the property, but operating profit cannot be expected under present price conditions.

"In order to safeguard investment in the company and to conserve a strong cash position through a critical period in cement history the directors voted to omit the usual quarterly payments to the stockholders until improvement in the industry's situation warrants other action. We confidently look forward to the resumption of and we hope an increase in dividends. Out of the present cement crisis will emerge a new and strengthened industry. The stronger companies will belong to their present owners—their stockholders. The weaker ones will belong to someone else. The directors have acted in the way that they think will insure to the Northwestern States the first and happy category.

"The company is in a strong financial position without a cent of indebtedness of any description and with the necessary funds in the treasury to meet a continuation of the present disturbed conditions."

Ideal Cement Reduces Dividend

THE directors of the Ideal Cement Co., Denver, Colo., have declared a quarterly dividend of 50c. per share on the no par value common stock, payable October 1 to holders of record September 15. Previously, quarterly distributions of 75c. per share were made. An extra dividend of 50c. per share on the common stock was also declared October 1.

Recent Dividends Announced

Alpha P. C. com. (qu.)	0.25, Oct. 24
Arundel Corp. (qu.)	0.75, Oct. 1
Calaveras Cement pfd. (qu.)	1.75, Oct. 15
Dolese and Shepard (qu.)	1.00, Oct. 1
Dufferin Paving and Crushed Stone pfd. (qu.)	1.75, Oct. 1
Ideal Cement com. (qu.)	0.50, Oct. 1
Ideal Cement com. (extra)	0.50, Oct. 1
Kelley Is. L. & T. (qu.)	0.50, Oct. 1
Santa Cruz Portland Cement com. (qu.)	1.00, Oct. 1

Why Alpha Cement Wishes to Reduce Capital

AS NOTED in Rock Products, September 12, p. 75, the Alpha Portland Cement Co., Easton, Penn., has called a special meeting of its stockholders (for September 30) to vote on reducing its capital from $26,134,500 to $20,486,000. According to President G. S. Brown:

"The cement industry in common with most other industries has been in a depressed and unprofitable condition for the last two years. The directors have continued to authorize the payment of dividends at a reduced rate, which have nevertheless been paid, partly from surplus, during this time. Dividends depend upon two things: (1) whether the condition of the company warrants their payment as a matter of sound business judgment, and (2) they can only legally be paid from surplus or accumulated earnings. A considerable part of the earnings of the company during the past twenty years has been capitalized through stock dividends in 1920 and 1925. If the stockholders approve this recommendation of the directors, the proposed action will return a part of these capitalized earnings to surplus. This will make the surplus legally available for dividend distribution greater than any sum which the directors would consider commercially prudent to withdraw from the business, and will thus obviate any legal restriction upon a continuance of dividends. At the same time the directors wish the stockholders to clearly understand that they make no promise or commitment as to future dividends. They recognize that many of the stockholders are dependent upon these payments and they desire to continue dividends so long as this can be wisely and prudently done. They recommend the removal of the legal limitations so that their future action on dividends may be determined solely from a consideration of what is wisest as a matter of business policy.

"Some companies have shown earnings by cutting down the rate at which the assets of the company are depreciated. Our experience of more than thirty years indicates that such action, so far as our company is concerned, would be very unwise."

Arundel Corp. Earnings

THE Arundel Corp., Baltimore, Md., declared the regular quarterly dividend of 75c. payable October 1 to stock of record September 21.

August net income was $225,011, against $222,812 in August, 1930. Current assets on August 31 amounted to $4,196,577, and current liabilities to $487,508.

The Arundel Corp. reports for eight months ended August 31, 1931, net profit of $1,524,031 after depreciation, depletion, federal taxes, etc., equivalent to $3.07 a share on 495,556 shares of no par capital stock. This compares with $1,730,155, or $3.51 a share, in first eight months of 1930.

Traffic and Transportation

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week of September 19:

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

23430. **Crushed stone** (trap rock) (See Note 3), from Westfield, Mass., to Oak Street, Mass. Present—90c per net ton. Proposed—50c. (See Note 4.)

TRUNK LINE ASSOCIATION DOCKET

M-1849. **Crushed stone, carloads** (See Note 2), from Tyrone Forge, Penn., to Phillipsburg, Penn., 60c per net ton, rate to expire January 1, 1932; present rate, 70c per net ton (See Note 4).

27537. **Sand, blast, glass and ground flint,** carloads (See Note 2), from Hancock and Round Top, Md., to Carrier, Penn., $2.10 per net ton.

M-1851. **Soapstone refuse, crushed or ground,** carloads, minimum weight 40,000 lb., from Esmont, Va. (when from N. & A. Ry., to Alloy and Hugheston, W. Va., $2.10 and Dana, W. Va., $2.20 per net ton (See Note 5).

27616. **Stone dust,** carloads, (See note 2) from Bound Brook, N. J., to South Bound Brook, N. J., 60c per net ton. Present rate, 70c (See note 4).

M-1855. **Screenings, crushed stone, stone, crushed; tailings, crushed stone,** in carloads (See note 2) to Kane and Durant City, P., from Buffalo, N. Y., $1.30, and from LeRoy, $1.40 per net ton. (See note 5).

M-1859. **Sand and gravel,** other than blast, engine, foundry, glass, molding or silica, carloads, (See note 2), from Otisville, N. Y., to Endicott, N. Y., $1.10 per net ton. Present rate, $1.30. (See note 4).

27630. **Crushed stone and screenings,** carloads, (See note 2), from Naginey, P., to Catawissa, P., $1.10 per net ton. Present rate $1.40. Reason—Proposed rate is comparable with rates to Paxinos and Muncie, Penn.

27636. **Sand,** carloads, (See note 2), from Jersey City Piers, N. J., to Newark, N. J., 69c per net ton. Present rate, 81c. Reason—Proposed rate is comparable with rate to Irvington, Bayonne and Bayway, N. J.

27646. **Sand, engine, blast, glass, molding and ground flint,** carloads, (See note 2), from Berkeley Springs, Great Cacapon and Hancock, W. Va., to Lonaconing, Md., $1.70 per net ton. Present rate $1.80. Reason: Proposed rate compares with rate from Tatesville, Penn.

27647. **(B) slate, dust, crushed, ground, refuse and scrap,** in packages or in bulk, carloads, minimum weight 50,000 lb., from Fair Haven to Castleton, Vt., inclusive, and from Poultney, Vt., to West Pawlet, Vt., inclusive:

To	—Proposed Rates— (A)	(B)
Medford, N. J.	27	22
Mt. Holly, N. J.	—	17
Moorestown, N. J.	—	17
Collingswood, N. J.	—	22

Above rates in cents per 100 lb., (See note 5).

CENTRAL FREIGHT ASSOCIATION DOCKET

29305. To establish on **crushed stone,** carloads, from Calcite, Mich. (near Rogers City), to South Milwaukee, Wis., rate of 227c per net ton. Present, 550c.

29310. To establish on **slag,** carloads (See Note 3), from South Chicago, Ill., to Gleason, Ind., rate of 95c. Route—Via usual available routes, except will not apply via C. I. & L. R. R. direct. Present—Class rate.

29311. To establish on **dolomite,** carloads (See Note 3), from Narlo, O., to Huntington, W. Va., rate of 169c per net ton. Present, 12½c (60% of sixth class).

29330. To establish on **sand and gravel,** in open top cars, carloads, regardless of weight, from proposed siding of the Ohio Gravel Co., ¾ mile east of Newton, O., to destinations on the Norfolk & Western Ry. within the switching limits of Cincinnati, O., rate of $10 per car, except to C. L. & N.-N. & W. deliveries at Avondale, O., Hunt Street, O., Court Street (Cincinnati), O., $20 per car, to expire with December 31, 1932. Present rates—From Gravel Pit, O., 30c per net ton, applicable under the intermediate clause. Route—Via Norfolk & Western Ry.

*29333 (1). To establish on **black limestone,** when shipped in box cars, carloads, minimum weight 60,000 lb., except when car of less capacity is furnished, in which case the marked capacity of the car will govern, from East St. Louis, Ill. (applicable only on shipments originating at points in territories described in Note 3, page 107, of C. F. A. L. Tariff No. 400-K), to points in Central Freight Association territory and points in Trunk Line arbitrary territory east of Pittsburgh, Penn., rates on basis of 60% of sixth class. Present—Classification basis.

29340. To establish on **stone, lake or river filling** (offal of quarry), in carloads, all cars to be loaded to cubical or visible capacity, from Amherst, O., to Jamestown, Penn., rate of 126c per net ton. Present—10c.

WESTERN TRUNK LINE DOCKET

Sup. 1 to 4781-G. **Rock, bituminous asphalt,** from New Orleans, La. (and points grouped therewith in Agent Emerson's Freight Tariff No. 1-H), to Deshler, Neb. Please refer to Docket Bulletin No. 2921, dated March 13, 1931, Docket No. 1031-N. This subject is canceled from docket.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason—To meet motor truck competition.

Note 5—Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

Sup. 1 to 4731-G. **Rock, bituminous asphalt,** from Deerfield, Eldorado Springs, Ellis, Harwood, etc., to East St. Louis, Ill. Please refer to Docket Bulletin No. 2946, dated April 11, 1931, Docket No. 4781-G. This subject is hereby withdrawn from further consideration, the affirmative action of S. W. F. B. Proposal 22649 disposing of it.

SOUTHWESTERN FREIGHT BUREAU DOCKET

23470. **Crushed asphalt rock,** from Dougherty, Okla., to points in Texas. To establish the following rates on crushed asphalt rock, carloads, minimum weight, marked capacity of car, except when car is loaded to full visible capacity, actual weight will govern, from Dougherty, Okla., to the P. & S. F. Ry. Texas points shown below:

Rates in cents per ton of 2000 lb. on crushed asphalt rock from Dougherty to points in Texas:

	Rate		Rate
Shattuck*	197	Touzalin*	197
*Oklahoma.			
Magoun	197	Posey	227
Follett	200	Slaton	245
Sherlock	200	Southland	245
Darrouzett	213	Buenos	245
Gaylord	213	Dugger	245
Booker	213	Cap Rock	227
Huntoon	213	Post	227
Twichell	213	Augustus	227
Perryton	227	Justiceburg	227
Lord	227	Cow Spur	227
Farnsworth	227	Sand Creek Spur	227
Waka	227	Eppler	227
Spearman	227	Fullerville	227
Higgins	197	Dermott	227
Coburn	200	Brand	227
Glazier	213	Snyder	227
Clear Creek	213	Chorn	213
Can. River Spur	213	Hermleigh	213
Canadian	213	Pyron	213
Isaacs	213	Bernecker	213
Mendota	213	Gannon	200
Lora	213	Sweetwater	200
Miami	213	Ranchland	154
Codman	213	Odell	162
Hoover	213	Chillicothe	162
Chanesa	213	Medicine Mound	162
Pampa	213	Grevelsand	170
Heaton	213	Margaret	170
Laketon	213	Crowell	170
Thorndike	213	Foard City	170
Mobeetie	213	Truscott	180
Briscoe	213	Benjamin	180
Allison	213	Knox City	190
Kings Mill	213	O'Brien	190
White Deer	213	Rochester	190
Cuyler	213	Rule	190
Panhandle	213	Sagerton	190
Lee	213	Hamlin	190
St. Francis	213	Plasterco	190
Folsom	227	McCaulley	190
Amarillo	227	Sylvester	190
Zita	227	Longworth	200
Haney	227	Skellytown	213
Canyon	227	Abell	213
Lester	227	Pomeroy	213
Umbarger	227	McBride	227
Dawn	227	Farish	227
Joel	227	Hillard	227
Hereford	227	Borger	227
Summerfield	245	Lider	227
Black	245	Aiken	227
Friona	245	Lockney	227
Parmerton	245	Floydada	227
Bovina	245	Muncy	227
Wilsey	245	Hettler	227
Farwell	245	Idalou	227
Lariat	263	Lorenzo	245
Muleshoe	263	Ralls	245
Mill	245	Crosbyton	245
Sudan	245	Doud	227
Amherst	245	Wolfforth	227
Littlefield	245	Balch	245
Bainer	245	Ropes	245
Anton	245	Meadow	245
Roundup	245	Challis	245
Shallowater	227	Brownfield	245
Broadview	227	Lahey	245
Cleta	227	Wellman	245
Ogg	227	Seagraves	245
Happy	227	Lisle	227
Kaffir	227	Hurlwood	227
Tulia	227	Smyer	245
Eunice	227	Opdyke	245
Kress	227	Levelland	245
Finney	227	Whiteface	245
Plainview	227	Perley	245
Furguson	227	Lehman	245
Hale Center	227	Haven	245
Swastika	227	Bledsoe	263
Alley	227	Lofton	245
Abernathy	227	Wilson	245
Monroe	227	Dune	245
Marnels	227	Tahoka	245
Lubbock	227	Skeen	245
Burris	227		

Rates as published in Item 952, Sup. 10, to S. W. L. Tarriff No. 26, do not provide shippers with rates to which they feel they are entitled; and they contend they must have a somewhat lower scale of rates to enable them to meet competition of Texas shippers of the same commodity. Rates, with a few exceptions, are based upon the Texas scale for single line hauls, employing actual milage via Santa Fe Lines. Proposed rates are the Texas short line scale, employing actual short line distances. This proposal is submitted with the understanding that should the Texas intrastate rates be increased to the rates prescribed in I. C. C. Docket No. 23094, rates from Dougherty to all points in Texas are to be revised to that basis and effective upon the same date.

ILLINOIS FREIGHT ASSOCIATION DOCKET

6300. **Molding sand,** carloads (See note 3), from Fayville and Thebes, Ill., to East St. Louis, Ill., and St. Louis, Mo. Present—12c per 100 lb. (class E). Proposed—115c per net ton to East St. Louis; 139c per net ton to St. Louis, when for deliveries on lines other than the Missouri Pacific R. R.; 127c per net ton for delivery on Missouri Pacific R. R. rails.

I. C. C. Decisions

No. 24333, Cement. Medusa Portland Cement Co. vs. C. B. & Q. et al. By division 2. Rate charged, carload of cement, York, Penn., to Trident, Mont., inapplicable. Applicable rate was 83.5c. Reparation of $12.54 awarded. Commissioner Mahaffie concurred, solely, he said, because it was consistent with principle in many decisions.

Seeks Distance Scale Rates on Industrial Sand

AN EFFORT to have the Interstate Commerce Commission establish a distance scale of freight rates in official classification territory which, for the first time, will provide a uniform basis of rates on so-called industrial sand has been made by Examiner Burton Fuller in a proposed report to the commission on more than a score of formal cases involving freight rates on this commodity. The examiner has grouped all the cases together in one report under the general designation "Industrial Sand Cases, 1930."

The scale recommended by Mr. Fuller applies to industrial sand, other than ground or pulverized, and for this class of traffic will result, generally, in reduced rates. His proposal concerning ground or pulverized sand will result, generally, in increases. For industrial sand as a whole, however, the recommendations, if adopted by the commission, will result in decreases in freight rates.

Examiner Fuller prescribed three separate scales of rates to be applied on industrial sand, other than ground or pulverized, designated as follows:

Scale I, to apply on high silica sand (containing not less than 95% silica) in open top cars, and on core sand, in open top cars, from origins west of a north and south line drawn through Cumberland, Md.; on other sand, in open top cars, from Michigan City and Willow Creek, Ind., Bridgman, Sawyer and Muskegon, Mich.; Barr, Bedford, Dundee, Geauga Lake, Massillon, Phalanx and Warwick, Ohio, and Polk, Schollard and Utica, Penn., and on gravel, in carloads, from Phalanx, Ohio.

Scale II to apply on high silica sand, in open top cars, and on core sand, in open top cars, from origins on and east of a north and south line drawn through Cumberland, Md.

Scale III, to apply on molding (naturally bonded) sand, in open top cars and in box cars, and on all other sand (except ground or pulverized sand) in box cars.

For distances up to and including 15 mi., the Scales I and II rates are the same (60c. per net ton), but, generally speaking, for distances over 15 mi. and not over 700 mi., the Scale I rates are lowest, the Scale II rates next and Scale III rates highest.

The rates above 700 mi. are the same for each of the three scales, whether applied to single or joint line hauls. Joint rates for lesser distances than 700 mi., under Scales I and II are to be made by adding 20c. per net ton for distances up to 350 mi. and 10c. for distances of 351 to 700 mi., with the provision that the haul from Tatesville, Penn., to destinations on the Pennsylvania railroad be considered as a single line.

Because of different transportation conditions within New England and the increased operating cost of the railroads in that territory, Mr. Fuller recommended a system of arbitraries over his suggested scale for application in New England. The arbitraries average about 25% higher than the scale for the remainder of official territory, ranging from 30c. per net ton to be added to hauls 50 mi. and under to 50c. for hauls over 220 mi.

He also recommended that the commission authorize the addition of an arbitrary not exceeding 70c. per net ton on traffic from origins in New York and New Jersey to destinations in New England through New York harbor. This would cover the increased cost of the movement through the harbor.

While recommending the application of a straight mileage scale to the traffic involved, Mr. Fuller said reasonable group and differential adjustments may be maintained, provided the average rate under each adjustment shall not be higher than if made under the scale. Further, he said, this recommendation should not be construed as authorizing the inclusion of the Mapleton and Hancock-Berkeley Springs districts in a single group in connection with Scale II for distances less than 700 mi., and that in connection with the other rates prescribed the Mapleton district should be accorded a differential under the Hancock-Berkeley Springs district not less than 50% of the difference under the scale to all destinations or destination groups to which the former is over 100 mi. less distant than the latter.

He recommended that the minimum weight on sand be 90% of the marked capacity of the car, except when the car is loaded to full visible or cubical capacity the actual weight should apply.

Announce Date on Iowa Gravel Rate Hearing

COMPLAINTS of the Moline Consumers Co., Moline, Ill., in regard to railroad freight rates on sand and gravel from Moline to points in Iowa will be heard by the interstate commerce commission examiners at Moline October 20, the commission has announced.

Examiner Edward Hansen will be in charge of the hearing. The Moline concern charges that the rates are too high and seeks adjustment.—*Moline* (Ill.) *Dispatch.*

Asks to Reopen South Carolina Rate Hearing

THE SOUTH CAROLINA railroad commission September 8 urged the Interstate Commerce Commission to reopen the case covering rates on sand, gravel and stone in South Carolina. The Interstate Commission, a short time ago, held that intrastate rates should be brought up to the same level as interstate rates.

The commission was told that "On account of the geographical location of railway rates in South Carolina, the location of supplies of sand, gravel and crushed stone and location of the various highways, much stone and gravel moving interstate into South Carolina and intrastate within the state moves over two or more lines of railroads even for comparatively short hauls. Much of the sand and gravel in the state is found on short or weak lines.

The South Carolina commission told the Interstate Commerce Commission that it also wished the case reopened for the purpose of receiving new and additional evidence showing many inequalities existing against short and weak lines and that after the case is heard again it prescribe rates for both single and joint line movements.

The Saluda Crushed Stone Co. of Greenville joined in the request.—*Columbia* (S. C.) *State.*

Continues Mississippi Gravel Rate Case

THE MISSISSIPPI railroad commission announced at the completion of its regular calendar that it had granted a continuance of the gravel rate case, about which public interest in the present docket had chiefly centered.

The sand and gravel revision case was continued until October after Gus A. Draper, chief highway engineer, told the commission that because of the emergency under which the highway commission had been working, he had had no time to prepare his case.

The Alabama Great Southern, the New Orleans and Northeastern, the Southern Railway and all other state trunk lines except the Gulf and Ship Island had asked upward revision. Mr. Draper said that such revision at such a time would be detrimental to present highway work.—*Columbus* (Miss.) *Dispatch.*

Certain Rates on Products of Stone Are Suspended

BY AN ORDER entered September 8, in Docket 3638, the Interstate Commerce Commission suspended from September 9, 1931, until April 9, 1932, the operation of certain schedules proposing to cancel the present commodity rates and apply in lieu thereof the full classification basis or combination rates on stone, limestone, granite, marble or slate, crushed, ground, pulverized or powdered, and related articles, including articles grouped therewith, in straight or mixed carloads, interterritorial, between points in the south, on the one hand, and points in Official and Western Trunk Line territories, on the other hand, also between points in the south and southern gateways and Ohio and Mississippi river crossings in so far as they apply on traffic between points in the south, on the one hand, and points in Official, Western Trunk Line and southwestern territories, on the other hand which will result generally in increases.

Rock Products Clinic

Masonry Cements—Two Kinds of Mortar Shrinkage

THE EDITOR: Referring to the editorial which appeared in Rock Products July 18: It is unfortunate that this throws the spotlight on only part of the facts brought out by Mr. Palmer's paper.

Take, for instance, the question of shrinkage. Mr. Palmer's article notes two kinds of shrinkage: First, the shrinkage which occurs after the mortar has hardened; and secondly, the shrinkage which occurs during the hardening process. Mr. Palmer's experiments show that as far as the subsequent shrinkage goes, lime mortar shrinks less than cement mortar, but they also show that in initial shrinkage lime mortar shrinks more than cement mortar. (The Bureau of Standards' Technologic paper No. 308 confirms this conclusion.) And a significant fact which his paper brings out is that the volume changes which occur in the initial shrinkage are about ten times as great as the volume changes in the subsequent shrinkage.

Now, a great many people who have studied the causes of leaky brick walls (among them Prof. Anderegg), are convinced that the crack between the brick and the mortar through which the water enters, in a great majority of cases, is not due to a broken bond, but is due to the fact that a bond never did exist in the first place. Our own observations bear out this theory. For if a wall leaks, it leaks as soon as the first rain storm hits it after the building is erected and not after the building has been subjected to a season of changes of temperature and alternate wetting and drying. Now, if it is true that the bond never did exist in the first place then it is evident that the initial shrinkage (which causes the mortar to contract and shrink away from the brick) plays a much greater part in contributing to leaky walls than does the subsequent shrinkage.

The editorial gives the impression that the change from lime mortars to cement mortars is largely responsible for leaky walls. It overlooks the fact that there have been other more important changes in brick construction during this same period. For instance, impervious brick are now widely used and it is now the standard practice not to wet even highly absorbent brick. Either of these, under certain conditions, may make it difficult to secure a good bond between the brick and the mortar. The Lime Association's statement that the change from lime mortars to cement mortars has caused leaky walls cannot be reconciled with the fact that in proportion to the lime mortar used, there have been just as many leaky lime jobs as leaky cement jobs.

Another fact that has been overlooked is that when Mr. Palmer made his experiments he cured his cement samples in a different way from the way he cured his lime samples. When he subjected his samples to alternate wetting and drying, he completely immersed his cement samples in water from the beginning. The lime samples were stored in dry air for three months, then moist air for three months, and then only partially immersed in water.

But if, as the editorial claims, subsequent shrinkage contributes to leaky walls by causing broken bonds, there is one very important practical fact which has been overlooked. When a good initial bond exists between the brick and mortar, there are no hair line cracks between the brick and mortar through which the water can enter; and the mortar in the wall can be subjected to alternate wetting and drying only if the mortar itself absorbs a large amount of the water which hits the face of the wall. Now, the absorption of any mortar is in direct proportion to the amount of lime in the mortar. This fact has been determined over and over again by various laboratories.

The emphasis the editorial places on the differences in minor characteristics of mortar confuses rather than clarifies the leaky wall problem. Because even the difference between the most extreme types of mortar is of little importance compared with the proper (1) workmanship; (2) design and construction details; (3) absorption of the brick at the time it is laid in the wall; (4) type of joint selected; and probably other less important conditions.

We hope that Rock Products will carefully study all of the facts available before taking sides.

John H. Mallon,
Louisville Cement Co.
Louisville, Ky.

* * * * *

Editor's Note

Rock Products will "take sides" under no circumstances. Its functions end when it has presented the case in all its angles to the best of its ability. Such editorial comments as have been made or will be made are designed to clarify the situation and not to argue for one side or the other.

A re-reading of Rock Products editorial will show that it merely expressed the conviction of the editor that (1) the increase in leaky masonry walls in high-class jobs and the growing use of cement mortars of one kind or another was not merely a coincidence; (2) that lime had virtues as a masonry material, well recognized in times past but overlooked in more recent times; (3) that tensile strength in masonry mortars was a much over-rated quality; (4) that bond between the masonry unit and the mortar was all important; (5) that some (we did not say all) masonry cements apparently lacked bonding properties, either because of excessive shrinkage or other cause. We said further that the desirable qualities of lime could undoubtedly be imparted to other masonry materials, and that the lime industry must be alert to capitalize the advantages of lime.

Undoubtedly poor workmanship, faulty plans, etc., account for some leaky walls; but they can not account for others where every possible precaution was taken by both architect and contractor to insure the best.

The Editor.

More About Masonry Cements

FOLLOWING is a letter written to S. G. Seaton in answer to his letter published in Rock Products, August 15, p. 70; both correspondents have kindly consented to its publication:

Dear Mr. Seaton: I very much appreciate your recent note to the editor of Rock Products.

In the conclusions of my paper, volume changes, I stated that there was a greater *range* of behavior among the mortars made from masonry cements than among the mortars made from the limes or portland cements. This statement was neither favorable nor unfavorable to masonry cements. To say that the range over a year in the mean daily temperature of Chicago is greater than that of San Francisco, does *not say* which city is warmer or colder.

If a few (I don't include you) of the various "discussionists" of this paper would read the thing and look at the data, they would find that mortars made from masonry cements Nos. 1 and 9 had volume changes less than that of any of the portland cements listed and that they compared favorably with lime-portland cement mixtures rich in lime.

In the event that an ambitious reader should elect to "average" the volume changes of the masonry cement mortars, I would warn him against so doing by presenting a simple analogy. There are ten horses and ten cows in the same lot. Each cow has two horns. Therefore the average number of horns per animal is one. Similarly any "average" of any data obtained with several different masonry cements would be very meaningless.

Perhaps out of all this fog-raising some small amount of good will yet come. Perhaps the subject is finally just beginning to receive the attention which it deserves. Perhaps a few of us will think about mortars in connection with leaky walls and will cease trying to put *all* of the blame for the condition on masons, on the bricks, on the architect or on the weather. Who knows?

L. A. Palmer,
Research Associate, U. S. Bureau of Standards.

Can the State Compel Producers to Earn a Profit?

And Can the State Enforce a Code of Ethics? Case of the Wisconsin Mineral Aggregate Industry Interesting and Illuminating

WISCONSIN HAS A LAW on its statute books, in theory something like those in Oklahoma and Texas, under which the governors of those states recently resorted to martial law to enforce reduction of petroleum production. It is a cooperative marketing law, originally designed to permit agricultural producers to combine and fix prices and sell cooperatively, under a code of ethics or trade practices, which the state itself is obligated to enforce, not only as regards members of the association, but all producers—on the theory, it is presumed, that a state has the right to protect its own natural resources for its own interest, or in the interests of its citizens.

A state supreme court decision early in the history of the law settled the point that if farmers had the right to form such cooperatives, other producers also had, otherwise the law would be unconstitutional as class legislation. The agricultural limestone producers of Wisconsin were among the first to take advantage of this broadened interpretation of the law. A description of the Wisconsin Cooperative Agstone Association and its scheme of operation under the law can be found in ROCK PRODUCTS, May 14, 1927. In the same issue the editor commented at some length on the uniqueness of the law, and the peculiar opportunity and license it gave a rock products trade association to demonstrate that it could be operated in a way to bring profit to its members and with due understanding and regard for the public interest.

Subsequently, building material dealers, concrete products manufacturers, mineral aggregate producers, and probably others formed cooperative associations. So far as we know the lives of all were short, and none of them any longer exist. All of them appeared to work very well for a time, but eventually *individualism*—to give it a polite name—reasserted itself, and the cooperative association failed as a solution of that much discussed problem: "How to make a profit on curtailed demand?" or "how to maintain prices in the face of overproduction?"

However, before the Sand, Gravel and Stone Cooperative Association of Milwaukee abandoned hope of the efficacy of the cooperative marketing law, it appealed to the state department of agriculture and markets, to enforce those provisions of the law designed to promote fair trade practices. This department has powers comparable to those of the Federal Trade Commission, so far as Wisconsin is concerned. It can hear evidence of violation of the law and, if it so decides, issue a "cease and desist" order. Failure to obey such a cease and desist order subjects the culprit to a possible fine of $5,000, two years in jail, or both. This is certainly putting enough teeth into a code of business ethics to satisfy the most ardent advocate of codes of ethics, or trade practice codes.

Stop, Look—And Read!

DO YOU THINK the time has come to have legitimate control of production and price fixing? Do you think a substitute can be found for the economic laws of supply and demand and of survival of the fittest?

Wisconsin, the progressive state in political experiments, is making a new experiment of great interest and significance to all industry, particularly so to the rock products industry, because mineral aggregate producers are the subject of the experiment.

The editors make no apologies for the length of this "story." It could have been "boiled down" to a small compass and give all the substantial facts in regard to this unique hearing. But the story would have suffered much in the "human interest" element.

The reader will see some glaring weaknesses in the industry (elsewhere, as well as in Milwaukee, we presume) that could be readily cured without the help of the state.

These and other points will be commented on in another issue. In the meantime the reactions of readers as to the feasibility or desirability of state or federal government control of the rock products industry will be most welcome.—The Editors.

Charges Made of Unfair Practices

The state department of agriculture and markets held such a hearing on the trials and tribulations of the sand, gravel and stone producers and dealers of Milwaukee in Milwaukee on September 10. Both members and non-members were summoned to appear to answer for themselves and their business conduct in the following phraseology:

"STATE OF WISCONSIN, DEPARTMENT OF AGRICULTURE AND MARKETS, PLAINTIFF, V. SAND, GRAVEL AND STONE COOPERATIVE ASSOCIATION, DEFENDANTS."

After naming both members and non-members of the association, the summons continues:

"The Department of Agriculture and Markets of the State of Wisconsin issues this complaint, stating its charges upon information and belief as follows:

"1. That the above named defendants are now and have been for several years past engaged in the sand and gravel business selling and distributing sand and gravel in the City of Milwaukee and in Milwaukee County.

"2. That said defendants may be classified into three groups, (1) those engaged in production and not distributing or retailing; (2) those engaged in sales only, buying from the producers, and (3) those who handle the product from the pit to the job.

"3. That the Sand, Gravel and Stone Cooperative Association of Wisconsin is a corporation organized under Chapter 185 of the laws of the state of Wisconsin.

"4. That said corporation has adopted certain rules and regulations for the conduct of its business, which said rules and regulations have been duly adopted by the members of said association.

"5. That said members, and in addition to the adoption of the rules and regulations, have signed a contract by and with the Association in which they agree to do certain things. . . .

"And have signed contracts by and with the said association and have approved the rules and regulations or code of ethics of said association.

"7. That the above named defendants who are members of said association and each of them have violated the contract that they entered into with the association and have repeatedly violated the rules and regulations of the association in the conduct of their business in that they have given secret rebates and price concessions in various forms in order to secure business and others have violated said rules by wilfully interfering with existing sales contracts between a member and its customer with the purpose and effect of inducing and causing a breach of such contract, and have further violated said rules and regulations by selling sand and gravel at or below cost for the purpose of injuring a competitor.

"9. That the above named defendants who are not members of the Sand, Gravel and Stone Cooperative Association of Wisconsin have resorted to unfair methods of competition and unfair trade practices in this; that they have wilfully interfered with existing sales contracts between other dealers and their customers with the purpose and effect of inducing and causing breach thereof. That at the time of such interference the said defendant and each of them knew of the existence of said contract; and in this that they have sold sand and gravel at or below cost for the purpose of injuring a competitor. And for the further purpose of destroying a competitor's business.

"10. That the above named defendants, both members and non-members, in doing as they have been doing as above set forth have been guilty of unfair methods of competition in business and unfair trade practices in business within the meaning of Section 99.14 of the Wisconsin statutes."

Just Like a Court

The hearing was conducted in court form by an assistant state attorney general, acting for the department of agriculture and markets, assisted by a department investigator and an auditor from the department. The association was represented by an attorney, who introduced witnesses, and his questions were designed mainly to draw out information and data on costs and selling prices. Cross questions by the state's representatives were designed, apparently in all sincerity, to develop some constructive suggestions from the producers themselves, as to how their ills could be cured.

Since our report is intended to bring out only those things which are of general interest and significance, no names will be mentioned. Otherwise, the report is based entirely on the official transcript of the hearing.

Typical Losses

The first witness operates three plants (including one operated by a subsidiary); is entirely a truck shipper; retails some of his product; besides washed sand and gravel sells his top soil or stripping; operates nine of his own trucks and hires 20 to 30 others; in 1930 his gross sales amounted to $174,599.91 for 110,750 cu. yd. of material (everything included); his out-of-pocket cost was $129,477.29; leaving a gross profit, including interest received and discounts taken of $47,806.81. But to the out-of-pocket cost mentioned must be added compensation of officers, salaries, wages and bonuses, repairs, rent, royalties, depreciation, bad debts, taxes, interest, contributions and other incidentals totaling $52,512.58, leaving a loss for the year of $14,034.54. The company continues in business because the owners and officers have not received all their salaries (and presumably no depreciation, etc., has been set aside). Wages were not cut in 1930, but they have been since the spring of this year because conditions went from bad to worse.

The state's auditor has examined the books of a number of the members and he reported his division of the group into (1) producers; (2) dealers; (3) producers and dealers. His first difficulty was that some kept costs in cubic yards and others in tons. Therefore he had to assume arbitrarily 2800 lb. per cu. yd. for a compilation and comparison of costs. Group (1), the producers, showed an average net operating loss of practically 6c. per cu. yd. in 1930; Group (2), the dealers lost practically 15c. per cu. yd.; Group (3), dealers and producers fared best with a loss of only 1c. per cu. yd. The Group (2), dealers, includes motor truck operators who buy and sell as well as haul the material for producers at less than cost.

WHAT salaries do the officers of an aggregate producing concern receive? That is something the state auditor wanted to know, and he got it and reduced it to a yardage basis. He also discovered that many companies were operating at a substantial loss.

The question was raised as to whether the officers of these companies were getting exorbitant salaries (an easy way, obviously to insure high costs). The state auditor testified as follows: "The entire officers' salaries in one of these organizations, as disclosed by their records, appears to be $3,600. Ranging from that up, it appears that the salaries at the other extreme were $20,500. The officers' salaries, interpreted in cost per cubic yard of material produced, in Group (1), producers, was 8.9c.; in Group (2), dealers, 9.7c.; in Group (3), producers and dealers, 5.2c. The average cost of officers' salaries for the entire group was 7.1c. per cu. yd.

Quarry Operator "Has Only Five Competitors"

A producer of both sand, gravel and crushed stone testified as follows:

Q. Have you had any interference with your contracts?

A. Well, the crushed stone, we practically had no business during 1930 or 1931.

Q. I beg your pardon?

A. We did very little business in the crushed stone line during 1930 and 1931, and the prices were so bad that we couldn't afford to operate.

Q. Let me ask you this: You also sell stone for buildings, so-called limestone?

A. Yes.

Q. Do you keep the cost of that branch separate from the others?

A. We do to a certain extent, but the cost of production would not be very great, because labor is exchanged a great deal, you see.

Q. How many men do you employ?

A. About 16 or 17 men now.

Q. Have you laid off any men during the year 1931?

A. Quite a few, about twenty.

Q. Have you cut any wages?

A. Yes, we cut the wages about ten to fifteen cents an hour.

Q. Now, in the selling of crushed stone, your competition was not quite as keen or wide-spread as in the gravel industry? That is correct, isn't it?

A. I don't believe there is a great deal of difference.

Q. By that I mean, there are not as many operators in crushed stone as are in the other field?

A. No, there are not so many operators in the crushed stone; there are practically only five in our locality.

Q. During the year 1930 or 1931, what has been your experience, as to whether or not you were selling at or below cost?

A. Well, we sold below cost.

Q. In both of those periods?

A. Yes.

A Coal and Gravel Dealer's Testimony

An interesting sidelight on prices both of sand and gravel and for truck haulage is conveyed in the following:

Q. What business are you in? In the sand and gravel business alone?

A. Sand and gravel, coal, and supplies.

Q. Coal and supplies. You also handle cement?

A. No, not to any extent.

Q. You handle building materials generally?

A. No, just coal.

Q. Now, are you a producer of gravel or do you purchase your gravel?

A. We have a pit that has been shut down since 1930.

Q. Since then the gravel you have sold you have purchased?

A. We purchased, yes.

Q. And deliver it with your own trucks?

A. Well, in 1930. This year we are delivering it by hiring trucks, delivering it by the yard, by the ton.

Q. In hiring trucks what do you pay for hired trucks?

A. Sand and gravel we pay from 25 to 50c. a ton, just depends on the trip to the city.

Q. Reduced on the basis of yardage it would be about how much?

A. About one-third more.

Q. So your price would be between 40 and 70c.?

A. Yes.

Q. Both for short hauls?

A. Short hauls, very short hauls. We only do business around our yard. We don't go out on the West Side, the East Side, or anywhere.

Q. In other words, since this condition started you have curtailed your business?

A. Absolutely. We can't sell at those prices.

Q. You haven't gone after the business since this situation arose?

A. No.

Q. Even with that condition has your company been selling at or below cost?

A. Below cost.

Q. Have you laid off any men?

A. Well, we did this year.

Q. I mean in reference to the gravel industry?

A. Yes.

Q. How many men?

A. In 1930 we had an average of eight men.

Q. And this year?

A. We have about two or three.

Q. And that is due to your curtailment?

A. For the sand and gravel part, yes.

Q. Have you cut wages?

A. No.

Q. You give the same wages for those that you employed?

A. Yes.

Q. In 1930 and 1931. Have you had any interference with your contracts?

A. What is that?

Q. Have you had any interference with your contracts?

A. No, not with our contracts this year because we haven't any.

Q. Did you have any last year?

A. Well, I don't want to say that we had interference with our contracts, but there was always about two or three on the job waiting to quote a price to see if they couldn't get it away from you.

Q. Then you got out of the field?

A. That is it.

Old Established Producer Describes Unusual Wage Policy

One of the oldest operators in the district, whose quarry and sand and gravel plants are 16 miles from Milwaukee's lake front, testified in part as follows:

Q. Have you cut wages?

A. I don't believe we have. We are operating, we operate on a little different basis. We have a monthly wage scale. Those, the monthly men, are asked to work until the business is got out; whether it is eight hours, ten hours, twelve hours, whatever it might be. We have very few hour rate men. I don't believe we have cut wages in our plant. The executives have taken a cut, though. May I add that?

Q. Do I understand by that that you hire a man by the month and he has to work either eight or ten or twelve hours depending upon the circumstances?

A. Depending upon the circumstances.

Q. And no overtime?

A. No overtime. We pay no overtime.

Q. Does that ever happen that he works less than eight hours?

A. It does, very often.

Q. What is the average that he works?

A. It is hard to say. I would say it would average six or seven hours a day, because we have not been operating on a Saturday for instance, and over the Labor day we shut down from Friday night; and we broke down on a Thursday and we didn't get started till Wednesday. So, with the exception of a few repair men, they had quite a vacation.

Q. Figuring that method during the year, is it advantageous to the company to hire labor on that basis rather than on a straight eight or ten hour basis?

A. We believe it is. It is a question of opinion.

Q. You believe it is yourself?

A. To us it is.

Q. That is, advantageous to the company. Because of that arrangement do you pay a scale of wages larger than that as paid in the industry?

IT was brought out in the testimony that the executives of one of the older companies took a cut in salaries of about 25%, although the wages of the men were maintained at the regular scale — a monthly rate irrespective of the number of hours worked.

A. I believe we do.

Q. Very much larger?

A. Well, we pay, I would say, twenty-five per cent more.

Q. Even with that increased wage, it would be still an advantage to the company to employ them upon that basis?

A. We believe so. We have had less—we have never had any labor trouble in our plant in the thirty-five years of its existence. We believe that they are more contented. We believe they are entitled to certain luxuries. We believe they are entitled to a fair living, and for that reason we have tried to maintain them on a decent scale of wages.

Q. Have you laid off any men in 1931 as compared with 1930?

A. That I couldn't tell you. I don't believe so in comparison with 1930. But 1930 was not a peak year with us.

Q. It wasn't a peak year?

A. No.

Q. Your operating costs haven't gone down that much have they?

A. We have made a substantial saving in 1931 operation over 1930.

Q. Without cutting wages?

A. Without cutting wages, yes, sir.

Q. Except the executives?

A. The executives.

Q. Did I understand you that the executives' salaries were cut?

A. Yes.

Q. What proportion of salaries paid are the executives' salaries?

A. Oh, I would say fifteen per cent.

Q. And do you know the cut that was made in executives' salaries, the percentage?

A. Yes.

Q. How much was it?

A. Twenty-five per cent.

Hijacking Each Other's Business

On the subject of "interference with contracts," condemned in all codes of business practice, the following situation was developed in Milwaukee (as a rule, however, producers were very reluctant to make charges in their testimony):

Q. Are you familiar with the practice in the sand and gravel industry with reference to obtaining contracts on a competitive basis?

A. Yes, sir.

Q. During the year 1931. Will you tell us what the practice has been?

A. I can tell you what our practice is, and that is: Better than fifty per cent. of the work is taken on a verbal contract. We have not any form of contract. Where the contractor wants a confirmation of the price quoted, either over the phone or verbally, we write him a letter, giving him the quotation, confirmation of the quotation.

Q. In selling back-fill material to contractors who do work for a municipality, in sewer and water pipe work, what is the practice when you make a quotation for the furnishing of material on a given job?

A. Well, the last few big jobs that we had, we confirmed the price quoted over the phone by letter.

Q. And the price quoted, was that on the basis of furnishing the material for the entire contract of that contractor?

A. Yes, sir.

Q. Now, has your company had any of those contracts in the year 1931?

A. Yes, sir.

Q. Do you know of any interference with contracts such as I refer to for furnishing back-fill material for city work?

A. Yes, sir.

Q. Will you describe the method employed in interfering with a contract of that kind?

A. Well, we had one job. About half of the job was done, and we know that competitors had their salesmen on the job trying to still get that job at prices below those we had in our contract.

Q. What was the price that you quoted on that particular job for back-fill material?

A. Delivery of the material only was 80c. a yard.

Q. And then I understand you took the excavated material from the trench?

A. Yes, sir.

Q. And you paid for that, how much?

A. Fifty cents a load.

Q. Do you know what the price of material to the contractor was after your contract was interfered with?

A. Our price did not change.

Q. It did not change?

A. No.

Q. They sold at the same price?

A. We continued to sell at the same price.

Q. What did you do?

A. We continued to sell and completed the job except some loads hauled by some competitors at the price at which the contract was originally made. I might add in there that this competitor did succeed in getting some loads in on that job.

Q. Did the competitor know that you had this contract?

A. He claims he did not know, although we told him we did.

Q. Are there any other instances where contracts have been interfered with in behalf of your company?

A. Yes, but in each instance that I recall, after talking to the competitor, they claimed they had no information that there was a contract or that we did make deliveries. I could recall several of them, that in each instance the competitor claimed that the contractor phoned them for a price even after we started to haul. In case their price was below ours, he would simply order them to haul and have us stop.

Q. And after that took place then you made no further deliveries on that job?

A. No, sir, unless we wanted to meet the other fellow's price.

Q. Well, did you have to meet the other fellow's price in some instance in the last year or two?

A. Not after we made a delivery.

Q. You simply were out of that contract the balance that was still to be furnished?

A. Yes, sir.

Q. You mentioned one case where a contract that you had was interfered with?

A. Yes, sir.

Q. Did you discontinue delivering to that contract?

A. Only for one day.

Q. Were you required to lower your price on that contract?

A. No, sir, we were asked but we didn't do it.

Q. You continued to deliver on the contract?

A. Yes.

Q. At the same price that you had contracted for?

A. Yes, sir.

Q. Your loss, if any, would come about by the fact that you did not have an opportunity to deliver as much material as you would have delivered under the contract had it been lived up to?

A. The loss was very small because there were only a few loads in comparison to the size of the job delivered by the competitor.

Q. Is that the only case where there was an interference with any contracts that you had?

A. It is not the only case, but, as I testified before, the competitor did not know that the work had started, that the contractor called him up and asked for a price, and in the event the competitors' price was below ours he gave them the order.

Q. Well, that has taken place, has it?

A. Yes, sir.

Q. And where you have had either an oral or a written contract with the contractor?

A. Yes, sir—well, an oral or a written contract, or where we had started to make delivery, which we feel is a contract, on an agreed price.

Q. Let me get that, to see if I have got that straight. Did you or did you not have a contract with the contractor?

A. In the one instance we did, we had a written contract with the contractor, which was accepted by the contractor.

Q. That was the case that you referred to a few minutes ago?

SOME producers quoted by the ton and some by the yard, which is an entirely different matter. And if the quotation is based on nothing more permanent than a telephone call, what is the unlucky bidder going to do? The commission has no opinion—as yet.

A. Yes.

Q. Now, you said there were other cases. Now, what were they?

A. The other cases were merely this: The contractor calls up, "At what price will you deliver to this certain job?," and we give him the price. He says, "All right. Start delivering on the job." We haul on one of these jobs at that price for close to a week, when he calls up and tells us he had a price which was considerably below ours, and tells us "If you want to meet that price, you can continue hauling on this job. Otherwise, we will get it somewhere else."

Q. But on an arrangement of that kind you would have no contract for any definite amount of sand and gravel that you were to deliver?

A. No, sir.

Q. Don't you feel that under those circumstances that the contractor would have the right to say when you were to stop delivering?

A. Well, it has been common practice, at least that is our experience, that where a contractor asks you for a price on a certain job, and he accepts it by ordering material from you at that price, that that price is supposed to govern the entire job.

Q. Well, has that been the practice here in Milwaukee or Milwaukee county in the past?

A. It has up to, I would say, the early part of 1930.

Q. But since that time it has not prevailed?

A. No, sir.

Q. When you quoted the price to the contractor for material at a certain job, for instance the building of concrete construction, the price that you quote was only on the basis of furnishing all the sand and gravel for that job. Is that true?

A. In every instance.

Q. And you expected to complete the deliveries at the price quoted for the entire job?

A. Yes, sir.

Q. Now, when that contract was interfered with, or solicited by someone else, or even terminated by the contractor as you indicated, that resulted in a loss to you?

A. Yes, sir.

Q. It is a fact, isn't it, that except for the large quantity of material, that the price you quoted wouldn't be that price?

A. Invariably would be higher.

A Producer Who Believes in Keeping Up the Cutting Game

Another producer had no qualms about cutting his price to hold his business:

Q. Has your company had any experience with the cancellation of contracts because of price cutting or interference by others in the industry?

A. It is very little that they have interfered. They have tried to take the contracts away, in some instances by meeting the price, but we kept the contract, we have had to cut the price on some contracts to hold them.

Q. You had to cut the price in order to hold the contract?

A. Yes, sir.

Q. Because some one else—

A. Had cut in under.

Q. Offered to cut your original price?

A. Yes, sir.

Q. Have you had any case where you have had a contract to sell sand and gravel and some competitor has come in and interfered with that contract?

A. Well, we had one experience of that kind last year; but I would say there were extenuating circumstances. We had a contract for quite a building here in the city; and I personally wrote the contracting firm our price, quoted them over signature; and we had quoted a certain price, $1.65 a ton—I would just as soon tell you—$1.65 a ton for washed material, either sand or stone. And we delivered to that job during the current month when they started. At the end of that month when they got their bill they were surprised to find that they were billed by the ton, because somebody else had quoted them at $1.65 per yard—which is quite a reduction. They paid the bill up to that date, but from there on we did not furnish. So it really was a misunderstanding that we got the job; and we did not find a great deal of fault with them doing it, because their quotation was below ours.

Why Producers Sell for Less Than Cost

All producers, with one or two exceptions having admitted selling below cost; of course, we all want to know *why*. Well,

here are some reasons the inquiry revealed:

Q. Now, can you give us any reason for the selling of your product below cost during this period?

A. In order to do business you had to; in order to get any business and do business you had to sell below cost. We have quite a number of our laborers who have been with us from eight to ten years, and we are going to make every effort to give those fellows work. Furthermore, we are established in this field, have spent quite a bit to get ourselves established, and we can't afford to get out of the business at this time.

Q. What effect if any would the closing of your industry due to present conditions have upon both your companies with reference to starting up when conditions would change? In other words, could your company afford to close its plant during this time in order to get away from selling at the prices that you have?

A. Well, the loss would be practically the same; our depreciation would go on, and a certain amount of overhead would go on, just the same, and it wouldn't be any benefit to us to close up at this time.

This Reason Has Wrecked Many a Business!

Another producer:

Q. Now, what in your opinion is the reason for selling at or below cost?

A. Opinion in that differs to quite an extent. The reason for it is this: You can't afford to shut down and lose your identity. The capital invested is so great, in order to meet competition, you can't help yourself, but go out and do the best you can. You can't shut down and lose your identity under the circumstances; that is one reason; and the other reason is to meet competition.

Now for the Cure

Much more could be given to illustrate the problem—quite a common one these days, we are sure every reader will admit. So you are all anxiously awaiting the solution.

First let's see what a consulting engineer and efficiency expert would do (very much boiled down):

Q. Have you as an engineer made any study of the sand and gravel industry, or investigation thereof?

A. I have.

Q. To what extent does that study go?

A. My study generally has been in the production and sale of other natural resources of similar character, over a period of years, in this particular community. From the information which has been given to me and from discussions with various producers, it appears very evident that your problem is strictly an economic one; it is neither that of accounting, nor legal.

It is true that during the good times that prevailed here in the few past years everyone or anyone that had the wherewithal found a piece of ground and opened up a pit. Thus, it has resolved itself into a capacity of production beyond that which this community can absorb.

If the people engaged in the business were thoroughly and intimately familiar with what their actual costs were this problem would not have resolved itself into as serious a problem as now exists.

We have then too many institutions with equipment of a very obsolete character, obviously bringing up costs. We have the modern institutions with equipment that will make this product at a cost much less than the man with the obsolete equipment. You have that element to deal with.

I am looking at this thing strictly from the business standpoint. You gentlemen here can develop a picture, which is the same as called a monoply but is not a monopoly, for the simple reason that you have a regulatory body governing the conduct of such single entity. That is one of the prime boons that is necessary in the sand and gravel business in this community, the assembly—and I say "assembly," I won't say "merger," I won't say "cooperative organization," but assembly of these properties on some basis where each can realize that which remains to it of its investment, after correct depreciation at least has been applied, and have some equity in this entity, where he obtains a fair return for his efforts, if he is still identified, or, if he is not identified, a fair return on that which he contributes to the stabilization of that business.

> ***"I HAVE not in all my experience throughout this country seen any commission that can take the initiative and establish a basis for the operation of an industry," said an engineer who was called to testify. "The initiative must be taken by the industry."***

Q. Right there: Then, I take it from what you state that you are in accord with some agency like the state marketing commission being a helpful factor to the industry to stabilize it?

A. There is no doubt in my mind but what the marketing commission, as a state body, is very essential for the stabilization of that business. But, we must remember this, like any other commission, the industry itself must take the initiative. I have not, in all my experience throughout this country seen any commission that can take the initiative and establish a basis for the operation of an industry. I believe that is true of the marketing commission. The initiative must be taken by the industry, but subject to the control and the approval or rejection of any policies or bases by that commission.

Q. Then you consider it the right policy on the part of this industry at least, the one we are discussing, to ask the aid of the state, so that it may be stabilized and remain an industry on a profitable basis?

A. I would put it just a little differently. I would say that these gentlemen engaged in this business should evolve a plan, which plan should then be first submitted to the commission, so that it may pass upon the legality, its application to the laws of the state, and as to its satisfactory and profitable economic functioning.

Q. In that plan I assume you would include the organization of the industry in such a way that a uniform system of accounting and a uniform system of practice in marketing the product would be established?

A. There is that; there are two things that are very essential in a plan of that character. It may be helpful if I state them to you.

Q. Yes.

A. You have to take a cooperative law which is fundamentally sound in its conception, and thoroughly workable in its proper application; and I want to lay stress on that phrase "proper application." That has been not only in this business, but in other businesses in this state, improperly applied. I think that the commission and others will bear me out in that. You have that law available for its application to your business.

There is in addition to that a modified plan of assemblage of properties that can be adopted. There is, thirdly, a plan of merger which has been suggested.

Now, then, you have three basic plans that can be worked on. First, the cooperative law as it now stands may be the very thing to adopt; and when I say that, I say "it may be" because no one is able to say today just what plan can be worked without knowing all of the facts incident to each and every enterprise. That may be the thing to do.

The modified plan may be the thing.

A merger may be the ultimate solution. We have in mind this condition: When a merger is considered, we have the assets and liabilities of each individual institution to take into consideraton. Some have enormous liabilities and relatively small assets. But above that we have in a merger, generally speaking, the necessity of doing public financing. I do not know whether that would be necessary in this instance or not, but, if it be necessary, it is a very, very inopportune time to attempt a thing of that kind. Our bankers today have the corners of their mouths down; the investment houses are not taking on any securities. So that it would be quite a difficult thing to go into the field today and ask public subscription to any plan of financing.

Therefore, I would urge that a plan be adopted whereby either the first or second propositions be given serious consideration. Then with the thought in mind that a uniform accounting system be certain, and a uniform basis of operation; and above all—this may touch some of you rather sharply, but I am asked for my opinion and I am

going to give it to you—above all, that a single entity should have the prerogative alone ot the sale and distribution of the commodity. The real reason why so-called cooperative organizations have failed in the past, if you will make a careful analysis, is because that entity has attempted everything in the business, but has left the sale of the commodity to the individual institutions, and those two conditions are absolutely incompatible; it has been proven so time and time again. You men are producers; go ahead and produce; but leave this single entity to sell and distribute the product. That is where the monopolistic feature comes in, and then again on the other hand it ceases to be a monopoly because that single entity is directly under the observation and control of the marketing commission, just as we have public utilities today under our utility commission.

Q. Then you are of the opinion that private industry, such as the sand and gravel industry, from the basic standpoint of the state is entitled to at least the same help on the part of the state that the utilities have been receiving from the state through the railroad commission?

A. Yes, indeed.

Legitimate Price Fixing

The thoughts of the acting commissioner then turned to the working out of such a scheme of state supervision of the sand and gravel industry and price regulation came up. The question was asked on what basis would sand and gravel prices be regulated by the state; here follows the discussion of this point:

A. On this basis: We have a history of production here. This is not a new enterprise. We have a history of operation, where a reasonable price can be arrived at so as to permit the correct operating cost in the recovery of that material and a fair return on the investment to the owners, a reasonable price, a reasonable profit.

Q. All right. That means valuation, doesn't it?

A. That means valuation.

Q. In the same way that we have in the public utility industry, and that means along with valuation all of the questions of valuation that you have in the public utility industry; shall it be investment? Shall it be cost of reproduction? Shall it be capitalized from earnings over the last 10 years? Then you have another factor, do you not, of the rate of return, so as to be a fair rate of return? Is it 6% or 7% or 8%?

* * * * *

The efficiency and production expert avoided a direct answer to this question, and of an equally pertinent one as to how new comers were to be kept out by the following answer:

A. You would shut out all new comers by this process, if the members of the industry will remember, keeping in their minds that this is a time for sacrifice on the part of every one in every line of endeavor, and pool their properties consistent with the times, consistent with the wear and tear that has taken place, place some sacrifice on it, enable the single entity to sell this commodity at a price that will embody a fair return to those included in it, operated economically as it should be, you will make it unattractive for others to enter and open up a new pit. If this business is going to evolve itself to a point where all the little fellows will say, "I am going to go into the sand and gravel business," then you have defeated the whole purpose and accomplished nothing.

But you can operate this on a basis that will make it unattractive for every Tom, Dick and Harry to open up a pit. Because the cause of your failure today is that during good times everybody went into it. And we have today—and I believe you men will agree with me—something around three and a half million production capacity, and you never did sell over two million in this town.

ONE producer told the commission it should issue an order that aggregates should not be sold below cost, in order to prevent depletion of the natural resources of the state—but subsequently said the producers would find a way to go on "cheating" just the same.

* * * * *

There was considerable more attempt to pin the expert down to actual details as to how he would regulate prices and prevent new competition, but nothing new was developed other than that such a combine as he had outlined would automatically be able to produce and sell so cheaply that a new comer would not be attracted into the field.

Producers' Views of State Supervision

Q. Will you tell the commission, if you can, what suggestion you have to make toward remedying a situation of this kind, where the product of an industry is being sold at a price below cost?

A. I could give them my opinion if it is worth anything, and I think it is the opinion of the board of directors of the Wisconsin Sand, Gravel and Stone Association that an order should be issued by the commission to the various concerns represented in this industry to discontinue selling at or below cost, in view of the fact that they are using the resources of the state, and from information that we have the state has no opportunity to get a return from taxes when operating at a loss. The condition, if it continues in this community is bound to result in continually lowered wages for the employes, with the result that the concerns are all taking themselves and their labor out of the buyers' market in this community. We know that there is approximately a 200% overproduction in this production of sand and gravel. Whether or not an order of that kind would remedy the situation we do not know.

Q. Have you any suggestion to make along the lines of how the depletion of these pits might in some manner or other be minimized, first, for the benefit of the state, and, secondly, for the improvement of the industry?

A. My answer to that would be a consolidation of a group so that they could control this industry to the extent that they could close down a certain number of pits and thereby stop the overproduction.

Q. Somewhat upon the theory of Governor Murray in closing the oil wells in Oklahoma? Is that the idea?

A. No, sir. That is not my idea of it.

Q. Just what is your idea? Elaborate a little further.

A. I feel that the only way to stop the present overproduction, the only possible in my mind, would be a merger of a group large enough to control the entire group, and this merged group to close up a certain number of pits.

Q. Do you know whether or not a survey has ever been made to determine the number of available pits in the counties from which this commodity comes into this county?

A. No, sir.

Q. Your idea would be to establish a merger of the member companies, is that it?

A. That is not my idea. It is my idea that that would, without a doubt, stop the present overproduction.

Q. You think with that situation that you would obtain any better relief through a cooperative association handling these commodities?

A. In view of the experiences that I had through the association we had formed, wherein it was found that you could not get a certain number of men in business to go along with you, I believe that if an order was issued to cease and desist selling at or below cost, in view of the fact that there is such tremendous overproduction, that we would be going right back into the same rut and they would all commence cheating in order to get some money to take care of their current bills.

* * * * *

Another producer, questioned as follows:

Q. You made the statement that you have to operate, even if you operate at a loss. Supposing the commission should issue a "cease and desist order," requiring you to stop selling at or below cost, what effect would that have upon you?

A. Not any more than it would have on the rest of them.

Q. If they would all do it, it would be all right?

A. In my opinion, they are all selling below cost; and if the commission issues a cease and desist order on the whole bunch,

that would be the best thing that could happen on the earth.

* * * * *

And another producer:

Q. You believe, do you, that the sand and gravel industry in the cooperative association, with the assistance of the state marketing commission, can be put upon a basis where it can be both profitable to the industry and fair to the public and to the state?

A. I see no reason why it shouldn't be.

Q. You think it could be done without the aid of the state marketing commission and a cooperative association?

A. No, I don't, right at the present time at least.

* * * * *

Another producer:

Q. What is your opinion as to whether or not this industry can be put upon a sound, stable basis through a cooperative association with the aid of the marketing commission?

A. Well, that is if they will just trust to each other, a cooperative concern would work fine. I know the first one worked fine till the mistrust came in and one wanted more than the other. That spoiled it all.

Q. Have you any objection to a "cease and desist order" being entered against you?

A. No, not at all. May as well quit as do business this way.

* * * * *

Another producer:

Q. Have you had any interference with your contracts?

A. I haven't taken enough so they can.

Q. In your opinion can this industry be put upon a stable basis through a cooperative association with the aid of the market commission?

A. I believe if you could regulate the human element or the human side of this business you might be able to do so. But there is so great a difference between men that I begin to doubt it. When men sit around a table and make an agreement in the afternoon and "bust it" before 9 o'clock in the morning, why I don't believe you can with that kind of men.

A. Are you willing to have the state issue a "cease and desist order" to your company?

A. I hope they got nerve enough to do it.

Q. Stopping you from selling at or below cost?

A. I would welcome it.

* * * * *

A producer who wants the state to use an iron hand:

Q. You have heard the statement made by the engineering expert here. Do you feel that that has merit in it?

A. I think his statement has merit in it. I feel as though the desired results could be secured through the cooperative law of the state, and especially if you would issue a cease and desist order we may be compelled to get down to a basis on which we will have to work, whereby we will receive a reasonable profit, and the state of Wisconsin will conserve a lot of its resources and possibly make some money at the same time off of our income tax, which it is not making today.

Q. If I understood the expert correctly, the plan that he outlined was to take over all the plants or all the properties and have one selling organization?

A. Well, if you could get them down to a basis they could agree on, that is one way, because you could rule it with the iron hand, and they will have to do as they are told.

Q. It would be the preferable way in you opinion to organize a cooperative organization and take over those plants, writing them down at their real worth, and then setting up a selling organization—do you think that would be preferable to some large company buying up the plants and finally crowding the little fellow out of the business entirely? Which would be preferable?

ANOTHER also told the commission that he did not believe the industry would ever cooperate with the commission to the extent of approving the issuance of a "cease and desist" order against selling mineral aggregates at or below the cost of production.

A. Why, I think the cooperative plan would be the better. I wouldn't be surprised if some of that was in the air right at the present time. It is crowding the little fellow out of business right now.

Q. Will it not be the outcome of this continued competition that sooner or later some big fellow will come along and buy up a lot of these properties and get control of the situation?

A. I was told that last spring, that certain interests in Chicago were waiting for the opportunity to do that very thing.

Q. Well, in your opinion which would be the best for the sand and gravel industry in this region, to control their own business by the plan outlined, or control by outside influences and outside capital?

A. I would say to control it through the local people that are now in the business.

* * * * *

One Producer Who Does Not Believe in State Regulation

A long established producer of sand and gravel and crushed stone was questioned:

Q. Do you think this business can be stabilized in this territory through the aid of a cooperative association with the help of the state through the marketing division?

A. I appreciate the sincerity of the marketing division, but I believe it is hopeless as far as any stabilization is concerned.

Q. Why?

A. Why, let's go back. Our company has been operated for two generations, and has had these cycles of ups and downs as far as prices are concerned. For instance, in 1920, 11 years ago, it was just in the same chaotic condition that you are in today; and then a certain number dropped out. There were exactly 26 producers in the state of Wisconsin. Now there are exactly 48 producers trying to serve the territory of Milwaukee. We alone could furnish all of the material, sand and gravel used in the city of Milwaukee in the year 1931. There is a tremendous overproduction. But I do not know how you are ever going to take care of it by any act of the marketing commission. I hope so, I wish it could be done, but our company would go broke on a 100,000-ton pro rata yearly basis. Our plant is not designed for that capacity. We are too big.

Q. Well, you mean to say by that that because your company has got a certain volume that you would sell that volume regardless of the production cost?

A. We have to get a certain volume, we have to sell it, at a certain price because depreciation alone amounts to about $30,000 a year in our particular case.

Q. Would your company have any objection to the marketing commission issuing a "cease and desist order" against selling at or below cost?

A. I don't believe so. We are open to cooperation. But I don't believe it would ever stick.

Q. I am not referring to the legal end of it, whether it would stick legally.

A. No, not legally. As far as we are concerned we would not question the legality of the marketing commission's act. But I do not believe that the gentlemen engaged in the sand and gravel industry would ever cooperate with the commission to that extent that it would last any length of time.

Q. What is your reason for that? Is it because the sand and gravel personnel is so different from any other, or what causes do you ascribe to that?

A. It is the personal element entering into it, with the thought in mind that "maybe by some hook or crook we can evade the issue." They did it before. We had one of the best cooperative associations that ever was developed. What did they do? They immediately set out to form other organizations and transfer their business to those other organizations. And they got by with it, got away with it.

Q. Well, isn't it a fact that that was probably due to the fact that there was not a state agency, they had not submitted to the marketing commission and there was no one there to prevent those unfair trade practices?

A. It wasn't so much unfair trade practices as it was a little bit of cleverness on the part of the guy who ran it, manipulated

it, saying to himself, "I can transfer my own assets to anybody I want to," and it can be all done under the due legal process of law, and that is what they did, and defeated the purpose for which the organization was organized.

Q. But the other organization had not submitted to the marketing commission?

A. I believe in form it was and had the approval of the marketing commission.

Q. But it never sought its aid, though?

A. No.

Q. I believe that you stated that you were perfectly willing that the Department of Agriculture and Markets issue an order requiring all sand and gravel men of the state and sand and gravel men in Milwaukee to sell at or above cost?

A. Yes, I agree to that. That is perfectly--

Q. But there was some question in your mind as to whether it would be lived up to?

A. Yes, sir.

Q. If I tell you that the party who disobeys that order is subject to a fine of $5000 or so many years in jail, would you consider that it had any teeth in it?

A. I would think so; but, boy! You would have quite a legal fight, because it is a question of costs as I see it. Our selling price hasn't fluctuated anywhere near what the market has fluctuated. In other words the market has gone down over 50% and our selling price hasn't gone down anywhere near that amount.

* * * * *

Q. Then it isn't a case of too small operating units but too many administrative units, is that your point?

A. Too many administrative units trying to exist.

Overproduction of Operating Personnel

Q. Well, then, do you think that a cooperative, assuming that you could organize one, could operate sufficiently efficiently to pay a return to each of the individual units in the cooperative, or would there be too large a number of administrative units? For example, we have many executives here. Do you feel that no matter how you would organize the industry, you would have to have fewer executives?

A. You would have to have fewer, because I don't think you could carry along every member of some company as an executive, and I don't believe that they would want to go back to the business that they were in before.

Q. Either that, or you would have to cut down the return on the capital to such an extent that there really would not be a return on it plus an exectuive of that kind.

A. You would have to cut down the return on the capital.

Q. So that your feeling, then, is that there are just too many; that the industry is over-manned, or is overdeveloped, that the industry is overdeveloped as far as capital is concerned—

A. Yes.

Q. And that it is over-manned as far as administrative personnel is concerned?

A. Absolutely.

Q. And that the second problem is just as great as the first?

A. It is. Not only that, may I add this, that there are a lot of plants trying to serve the Milwaukee market that should not be counted in this picture at all.

Q. Then any plans for stabilization that you could see that would be workable would mean not only laying off some of the capital but also laying off some of the administrative personnel?

THE reader now has all sides of the picture and can begin to guess how the Wisconsin Agricultural and Marketing Commission will solve the problem. Human nature being what it is, who can say definitely what the outcome of the hearing will be?

A. That is true.

Q. As your analysis of the situation then, would it be about this, that you have got an over-expanded condition in the industry as regards production, as regards executive personnel?

A. That is true.

Can the Law of Survival Be Softened?

Q. There are two ways of reducing that. One is the more or less old-fashioned but effective way of going on about as you are and allow the substantial portion of the industry to be broke?

A. Yes.

Q. At which time the market will stabilize itself. That is the assumption upon which our competitive system is based. We will call it planless; the first one is more or less a planless proposition?

A. Yes.

Q. It is a cure by itself. Or there might be a planned method of arriving at the same result?

A. Yes, sir.

Q. But that would mean—

A. —an orderly—

Q. —an orderly method.

A. Yes.

Q. And perhaps not quite so gruesome. That probably would involve some central organization to take stock of the assets, and make a market survey for the industry, and also a survey of operating conditions and operating bases?

A. Yes.

Q. That would probably result in reducing the personnel. That would probably mean a stepping down of many of the executives in the industry today; they would probably have to do a different sort of work or get out of the industry entirely.

A. Yes.

Q. Does that represent your analysis? On the one hand a chaotic proposition, on the other a very drastic proposition but perhaps more orderly in design.

Not Proud of His Brother Producers

A. That is about the way I size the situation up. For instance, if you go down that list of members and non-members, how many legitimate sand and gravel producers have you got in that list? Ten years ago there wasn't 10% of those people on that list. They have got into something because it was lucrative at that time, with the idea in mind that just the minute that your conditions got such that I can't make a profit I will turn to some other line of business; and that is what they are doing. You called the roll today, and there are very few of them that had interest enough in this meeting to stay right here and listen and see what was going on. I would hate like thunder to be classed as a producer with 48 names that you have got listed. They are not sand and gravel dealers or producers. They are usurpers, if I may call them that. They have drifted into this business, and no other way, because in some artificial stabilization a price has been raised exorbitantly.

Q. Suppose it were possible to stabilize the industry; let us assume that. What is your idea of how a stabilized industry could be run?

A. My idea is this: That producers like ourselves, large producers like ourselves, where we have always averaged 200,000 tons of sand and gravel into the city of Milwaukee, we should withdraw from the retail market; in other words, sell out to some car shipper, or some dealer who has the truck service; and that 200,000 tons being taken out of this market would help that condition. In other words, we are not here fighting for the business; we are taking care of the business; and all we want is a fair price for our material.

If you did that with the other shippers in this market and gave them a fair price for their material, and took care of them in regard to a certain tonnage, they certainly would "play ball" with the organization. But there are some shippers that would have to go out of the picture because they are not economically situated.

* * * * *

The reader who has got thus far has all sides of the picture and a splendid cross-section of the human element. How will the Wisconsin Agricultural and Marketing Commission solve the problem? Certainly we shall all watch with interest, because it will be enlightening—we hope!

Sand and Gravel Safety Contest of 1930

IN the 1930 safety competition among sand and gravel plants, 76 plants, situated in 20 states, participated, as compared with 26 plants, located in 13 states, in the year before. The number of man-hours of employment, which indicated the amount of exposure to occupational hazards, was 4,915,592, an increase of more than 100% over the previous year's total of 2,259,572 hours. The frequency of accidents declined from 74.4 per million man-hours for all plants enrolled in the first year's contest to 42.7 per million man-hours for all plants enrolled in 1930. The accident-severity rate was reduced from 9.7 days of disability per thousand man-hours of exposure in 1929 to 5.9 days of disability per thousand man-hours of exposure in 1930.

The actual number of accidents reported for 1930 by 76 plants included four deaths and 206 injuries whereas the 26 plants that were enrolled in 1929 reported three fatalities and 165 injuries.

Under the rules of the contest all "lost-time" injuries are reported—that is, all injuries that disable an employe for more than the remainder of the day on which the accident occurred. If the employe is physically able to resume his work on the day following the accident, the injury is not classed as a lost-time injury.

The contest covered accidents and man-hours worked by all employes at the plant who were employed by the same company, and included work up to the point of delivery of the material directly to consumer or to independent agency of transportation.

Two Trophies Awarded

Two trophies, provided by ROCK PRODUCTS are awarded to the winning companies in the sand and gravel safety contest each year. Awards are made on the basis of reports of accidents and man-hours worked, which the companies furnish to the Bureau of Mines. These trophies do not become the permanent property of the winning companies but are held for one year and then are transferred to the winners of the succeeding year's contest. All sand and gravel plants, regardless of size, that are members of the National Sand and Gravel Association are eligible to enroll in the contest, but for the purpose of awarding the trophies the plants are divided into two classes: first, those that worked 100,000 or more man-hours during the contest year; and, second, those that worked less than 100,000 man-hours.

First place among the larger plants in 1930 was won by the Missouri River plant of the Stewart Sand and Material Co., at Kansas City, Mo. This plant is a river-deposit operation and its record for the calendar year 1930 showed 108,753 man-hours of work without an accident causing loss of time to an employe. Second place among the larger plants was won by the Manor plant of the Warner Co. through the operation of the company's lake-deposit plant at Tullytown, Bucks county, Penn. This plant had a record of 225,852 man-hours with only two employes injured; these injuries, both temporary in character, caused a total of 24 days of disability, thus indicating an accident severity rate equal to 0.106 lost days for each thousand man-hours of exposure to hazard.

Among the smaller plants—those working less than 100,000 man-hours—first place was won by the Potts-Moore Gravel Co., whose bank-deposit plant at Waco, Tex., was in operation for 79,881 man-hours without a lost-time injury. Second place in this group was won by Jahncke Service (Inc.) for operating its plant at Roseland, La., for 71,246 man-hours without a lost-time injury.

The trophies for 1930 were presented to the Stewart Sand and Material Co. and the Potts-Moore Gravel Co. The relative standing of competing companies is shown in Table 1, in which the various plants have been arranged according to their accident-severity rates. In calculating the accident-severity rates, which reflect the number of days of disability from accidents, each death and permanent total disability is charged with 6000 lost days as shown in Table 2. The table and notes appended thereto also show the loss of time charged against injuries of a permanent, partial, or temporary nature.

Temporary disabilities are weighted according to actual calendar days of disability, including Sundays and holidays if injured employe's disability actually continues on those days; that is, all days will be counted except day of accident and day of employe's ability to return to duty. Hernia is classed as a temporary disability to be charged with the actual number of calendar days during which the employe was physically unable to work.

LOWER ACCIDENT RATES were the outstanding feature of the second annual sand and gravel safety competition conducted in 1930 by the United States Bureau of Mines in cooperation with the National Sand and Gravel Association. Both the frequency and severity rates for accidents were greatly reduced as compared with those shown by the first year's contest, that for 1929. Three times as many plants were enrolled, and the number of man-hours of work represented was more than doubled.

This report by W. W. Adams, chief statistician, demographical division, U. S. Bureau of Mines, is contained in Bureau of Mines Report of Investigations 3133.

Classification of Plants

In order to determine the relative hazards of the various types of sand and gravel operations, all of the plants that took part in the safety contest of 1930 were classified according to the kind of deposit from which the sand and gravel were obtained, as follows:

1. Dry bank.
2. Pit—(a) dry, (b) wet.
3. Marine—(a) river, (b) natural lake, (c) ocean.

In this classification a dry bank is defined as a sand and gravel operation where the deposit lies at a greater elevation than the working level of the plant; a pit is a plant where the deposit is lower or beneath the working level. A pit may be wet or dry; if wet, it may be by artificial or natural flooding. A marine plant is one where the deposit lies under a river, natural lake, or ocean.

Two operations did not fall in any of these groups and were classified under the heading "wet pit, and river" plants.

Comparative data for each type of operation represented in the contest are given below for the 76 plants reporting for 1930.

COMPARATIVE DATA FOR EACH TYPE OF THE 76 PLANTS COMPETING IN THE SAFETY CONTEST OF 1930

Type of plant	Number of plants	Man-hours	Accident rates: Frequency	Accident rates: Severity
Marine, lake	4	648,907	38.526	0.391
Wet pit, and river	2	174,151	45.937	.924
Dry pit	4	209,972	33.338	1.514
River	35	1,925,899	30.116	3.808
Bank	22	1,104,694	62.461	7.015
Wet pit	9	851,969	50.471	15.443
Total, 1930	76	4,915,592	42.721	5.894
Total, 1929	26	2,259,572	74.350	9.713

TABLE 1. SAND-AND-GRAVEL SAFETY CONTEST, 1930; ACCIDENT DATA FOR INDIVIDUAL PLANTS*

Rank	Type of plant	Hours worked	Number of accidents†					Number of days of disability†					Frequency‡ rate	Severity‡ rate
			F.	P.T.	P.P.	Temp.	Total	Fatal	P.T.	P.P.	Temp.	Total		
1	River	108,753	..	..	..	..	0	..	..	..	..	0	0.000	0.000
2	Bank	79,881	..	..	..	..	0	..	..	..	..	0	.000	.000
3	River	71,246	..	..	..	..	0	..	..	..	..	0	.000	.000
4	Wet pit	66,044	..	..	..	..	0	..	..	..	..	0	.000	.000
5	Bank	62,824	..	..	..	..	0	..	..	..	..	0	.000	.000
6	Wet pit	62,371	..	..	..	..	0	..	..	..	..	0	.000	.000
7	River	61,450	..	..	..	..	0	..	..	..	..	0	.000	.000
8	River	52,345	..	..	..	..	0	..	..	..	..	0	.000	.000
9	Wet pit	50,483	..	..	..	..	0	..	..	..	..	0	.000	.000
10	Wet pit	46,532	..	..	..	..	0	..	..	..	..	0	.000	.000
11	Bank	43,300	..	..	..	..	0	..	..	..	..	0	.000	.000
12	River	40,907	..	..	..	..	0	..	..	..	..	0	.000	.000
13	River	36,865	..	..	..	..	0	..	..	..	..	0	.000	.000
14	Dry pit	31,755	..	..	..	..	0	..	..	..	..	0	.000	.000
15	River	29,455	..	..	..	..	0	..	..	..	..	0	.000	.000
16	Wet pit	27,474	..	..	..	..	0	..	..	..	..	0	.000	.000
17	River	25,560	..	..	..	..	0	..	..	..	..	0	.000	.000
18	River	25,022	..	..	..	..	0	..	..	..	..	0	.000	.000
19	Lake	22,432	..	..	..	..	0	..	..	..	..	0	.000	.000
20	Bank	16,498	..	..	..	..	0	..	..	..	..	0	.000	.000
21	River	16,013	..	..	..	..	0	..	..	..	..	0	.000	.000
22	Bank	15,626	..	..	..	..	0	..	..	..	..	0	.000	.000
23	River	12,602	..	..	..	..	0	..	..	..	..	0	.000	.000
24	River	12,071	..	..	..	..	0	..	..	..	..	0	.000	.000
25	Dry pit	9,982	..	..	..	..	0	..	..	..	..	0	.000	.000
26	River	9,342	..	..	..	..	0	..	..	..	..	0	.000	.000
27	River	7,130	..	..	..	..	0	..	..	..	..	0	.000	.000
28	River	6,835	..	..	..	..	0	..	..	..	..	0	.000	.000
29	Bank	6,686	..	..	..	..	0	..	..	..	..	0	.000	.000
30	River	5,860	..	..	..	..	0	..	..	..	..	0	.000	.000
31	Bank	2,848	..	..	..	..	0	..	..	..	..	0	.000	.000
32	River	430	..	..	..	..	0	..	..	..	..	0	.000	.000
33	River	12,000	..	..	..	1	1	..	..	..	1	1	83.333	.083
34	Bank	59,264	..	..	..	3	3	..	..	..	5	5	50.621	.084
35	River	19,748	..	..	..	1	1	..	..	..	2	2	50.638	.101
36	Lake	225,852	..	..	..	2	2	..	..	..	24	24	8.855	.106
37	River	54,131	..	..	..	1	1	..	..	..	7	7	18.474	.129
38	River; wet pit	47,810	..	..	..	1	1	..	..	..	8	8	20.916	.167
39	Wet pit	72,491	..	..	..	2	2	..	..	..	14	14	27.590	.193
40	Bank	75,895	..	..	..	3	3	..	..	..	22	22	39.528	.290
41	River	21,839	..	..	..	1	1	..	..	..	7	7	45.790	.321
42	Bank	69,828	..	..	..	3	3	..	..	..	23	23	42.963	.329
43	River	47,791	..	..	..	2	2	..	..	..	18	18	41.849	.377
44	River	107,682	..	..	..	2	2	..	..	..	44	44	18.573	.409
45	Lake	235,965	..	..	..	16	16	..	..	..	102	103	67.807	.432
46	Bank	43,576	..	..	..	1	1	..	..	..	19	19	22.948	.436
47	Bank	36,039	..	..	..	1	1	..	..	..	17	17	27.748	.472
48	River	269,195	..	..	..	4	4	..	..	..	148	148	14.859	.550
49	River	23,628	..	..	..	1	1	..	..	..	13	13	42.323	.550
50	Wet pit	232,982	..	..	..	19	19	..	..	..	143	143	81.551	.614
51	Dry pit	117,461	..	..	..	5	5	..	..	..	83	83	42.567	.707
52	Lake	164,658	..	..	..	7	7	..	..	..	128	128	42.512	.777
53	River	206,509	..	..	..	12	12	..	..	..	168	168	58.109	.814
54	River	49,646	..	..	..	3	3	..	..	..	43	43	60.428	.866
55	River	170,696	..	..	..	5	5	..	..	..	174	174	29.292	1.019
56	River	31,371	..	..	..	2	2	..	..	..	32	32	63.753	1.020
57	River	170,461	..	..	..	7	7	..	..	..	177	177	41.065	1.038
58	Bank	25,271	..	..	..	1	1	..	..	..	28	28	39.571	1.108
59	River; wet pit	126,341	..	..	..	7	7	..	..	..	153	153	55.406	1.211
60	River	43,554	..	..	..	3	3	..	..	..	53	53	68.880	1.217
61	Wet pit	186,166	..	..	..	9	9	..	..	..	308	308	48.344	1.654
62	Bank	24,008	..	..	..	2	2	..	..	..	51	51	83.306	2.124
63	River	15,143	..	..	..	1	1	..	..	..	35	35	66.037	2.311
64	Bank	58,965	..	..	..	2	2	..	..	..	150	150	33.918	2.544
65	Bank	48,280	..	..	..	6	6	..	..	..	137	137	124.275	2.838
66	Bank	22,966	..	..	..	2	2	..	..	..	76	76	87.085	3.309
67	Bank	192,561	..	..	..	32	32	..	..	..	696	696	166.181	3.614
68	River	34,971	..	..	..	3	3	..	..	..	134	134	85.785	3.832
69	Bank	22,125	..	..	..	2	2	..	..	..	89	89	90.395	4.023
70	Dry pit	50,774	..	..	..	2	2	..	..	..	235	235	39.390	4.628
71	River	41,085	..	..	..	4	4	..	..	..	205	205	97.359	4.990
72	Bank	60,945	..	..	1	5	6	..	..	300	39	339	98.449	5.562
73	Bank	6,366	..	..	..	1	1	..	..	..	46	46	157.085	7.226
74	Bank	130,942	1	..	..	3	4	6,000	..	..	51	6,051	30.548	46.211
75	River	84,563	1	..	..	4	5	6,000	..	..	72	6,072	59.128	71.804
76	Wet pit	107,426	2	..	1	10	13	12,000	..	600	92	12,692	121.014	118.146
Totals and averages, 1930		4,915,592	4	0	2	204	210	24,000	0	900	4072	28,972	42.721	5.894
Totals and averages, 1929		2,259,572	3	0	2	163	168	18,000	0	1500	2447	21,947	74.350	9.713

*As the accident reports from the companies are considered confidential by the U. S. Bureau of Mines, the identities of the plants to which this table relates are not revealed.

†F, fatal; P.T., permanent total disability; P.P., permanent partial disability; Temp., temporary disabiliy.

‡Frquency rate indicates number of fatal, permanent, and other lost-time accidents per million man-hours of exposure; severity rate indicates number of days lost from accidents per thousand man-hours.

The accidents on which the foregoing rates are based were classified as shown below.

The best safety record, as far as frequency of accidents is concerned, was for river-deposit operations. Next in order, and almost as good, was the record for dry pits. Ranking third, and only slightly less favorable, were the lake-deposit operations. Each of these three classes of plants had an accident-frequency rate better than the average for all of the 76 plants combined. Some-

CLASSIFICATION OF ACCIDENTS

Type of plant	Fatal	Permanent—Total	Permanent—Partial	Temporary	Total
Lake	..	..	..	25	25
Wet pit, and river	..	..	..	8	8
Dry pit	..	..	..	7	7
River	1	..	..	57	58
Bank	1	..	1	67	69
Wet pit	2	..	1	40	43
Total, 1930	4	0	2	204	210
Total, 1929	3	0	2	163	168

CLASSIFICATION OF ACCIDENTS BY DAYS LOST

Type of plant	Fatal	Permanent—Total	Permanent—Partial	Temporary	Total
Lake	.....	..	.....	254	254
Wet pit, and river	.....	..	.....	161	161
Dry pit	.....	..	.....	318	318
River	6,000	..	.....	1,333	7,333
Bank	6,000	..	300	1,449	7,749
Wet pit	12,000	..	600	557	13,157
Total, 1930	24,000	0	900	4,072	28,972
Total, 1929	18,000	0	1,500	2,447	21,947

TABLE 2. SCALE OF TIME LOSSES FOR WEIGHTING DEATHS AND PERMANENT INJURIES TO SHOW SEVERITY OF ACCIDENTS

Nature of injury	Degree of disability in percentage of permanent total disability	Days lost
Death	100	6000
Permanent total disability	100	6000
Arm above elbow, dismemberment, or permanent disability of	75	4500
Arm at or below elbow, dismemberment, or permanent disability of	60	3600
Hand, dismemberment, or permanent disability of	50	3000
Thumb, any permanent disability of	10	600
Any one finger, any permanent disability of	5	300
Two fingers, any permanent disability of	12½	750
Three fingers, any permanent disability of	20	1200
Four fingers, any permanent disability of	30	1800
Thumb and one finger, any permanent disability of	20	1200
Thumb and two fingers, any permanent disability of	25	1500
Thumb and three fingers, any permanent disability of	33⅓	2000
Thumb and four fingers, any permanent disability of	40	2400
Leg above knee, dismemberment or permanent disability of	75	4500
Leg at or below knee, dismemberment or permanent disability of	50	3000
Foot, dismemberment or permanent disability of	40	2400
Great toe, or any two or more toes, any permanent disability of	5	300
One toe, other than great toe, any permanent disability of	0	.....
One eye, loss of sight	30	1800
Both eyes, loss of sight	100	6000
One ear, loss of hearing	10	600
Both ears, loss of hearing	50	3000

what higher than the general average were the accident-frequency rates for wet pits and banks.

A similar comparison based upon accident-severity rates is given in the foregoing table, although the figures are perhaps not typical because the group rates are affected greatly by the scale charges of lost days for deaths and permanent injuries and the relatively small number of man-hours of employment in each group of plants.

From the records submitted to the United States Bureau of Mines in connection with the contests of both 1929 and 1930, it seems reasonable to say that, as among operations of the bank, wet pit, and river types, the river plants have the most favorable safety record as far as accident frequency is concerned. Wet pits appear to rank second and bank-deposit plants third. Records for other types of plants are too meager, as yet, to form a basis for comparison, although such rates as can be calculated from records thus far available are presented in this paper.

In 1930 nine plants of the wet-pit type, operating 851,969 man-hours, had an accident-frequency rate of 50.47 per million man-hours, as compared with a rate of 68.82 per million man-hours for ten similar plants that operated 1,122,207 man-hours in 1929.

For bank plants an average rate of 62.46 was reported by 22 operations that worked 1,104,694 hours, as compared with a rate of 86.69 for 12 plants that operated 967,514 hours in the preceding year.

A comparison of the accident rates disclosed by the 1930 contest with those disclosed by the contest of 1929, takes on additional interest when we observe the comparative rates for identical plants that participated in the contest during both years. Among sand and gravel operations of the river type, four plants competed for the safety trophies during both years' contests; these four plants reduced their accident-frequency rates from 74.829 in 1929 to 37.187 in 1930. These figures represent 200,000 man-hours of exposure in 1929 and 188,000 man-hours in 1930.

Seven identical wet-pit plants whose volume of employment was 823,000 man-hours in 1929 and 638,000 in 1930 had an accident-frequency rate of 53.485 in the first year and 53.264 in the second year.

Eight identical plants of the bank-deposit type, representing 608,000 man-hours in 1929 and 487,000 hours in 1930, had a frequency rate of 34.525 in the first year's contest and 34.899 in the second year's contest.

Four Fatal Accidents

Of the four men killed during 1930 one was a clamshell engineer. He was near the loading track, loading sand, and in attempting to tighten a cable, he was caught by the cable and wound on to the drum. Both of his legs were broken and he died as a result of his injuries.

An oiler employed at a wet-pit plant, while working at a gravel screen, died as a result of injuries which he received when his clothing became caught and wound around a moving shaft, the man being pulled around the shaft.

A dredge helper was drowned when he fell off a pontoon line into 60 feet of water.

A night watchman was drowned, the cause of the accident being unknown.

Because of these four fatalities, each of which is considered to be the equivalent of 6000 lost days, the year's record for the contest as a whole shows that the largest loss of time from accidents was due to machinery and drownings. From the viewpoint of the number of persons injured, however, the principal causes of accidents were handling of objects, machinery, falls of persons, stepping on or striking against objects, haulage, and hand tools. These six classes of accidents covered 77% of the total number reported by all companies. These facts are shown in Table 3.

There was a rather wide variation in the average duration of disability from temporary lost-time accidents at the different types of sand and gravel plants. At lake plants, for example, an employe meeting with an accident causing a temporary injury lost an average of 10 days. The average for injured employes at wet-pit plants was 14 days; at bank plants it was 22 days, and at river plants it was 23 days. These are the averages for plants that reported for 1930; the figures should not be accepted as necessarily typical until similar figures for more than one year become available.

Accident Statistics

TWO RECENT PUBLICATIONS of the Bureau of Mines should be of interest to students of accidents in industry who want to compare rates of accidents of their industry with the rate in allied industries. The publications are bulletin 341, Coal Mine Fatalities in the United States, 1929; and bulletin 342, Metal-Mine Accidents in the United States, 1929.

Civic Organization Sponsors "Gravel Bee"

THROUGH efforts of members of the Lions club, a gravelling "bee" was held at Timber Lake, S. D., and practically the whole town participated. The object was to improve Main street. A large number of men, some with trucks, volunteered, and the street was placed in first class condition by filling low places and spreading a good coat of gravel.—*Sioux City* (Ia.) *Journal.*

TABLE 3. CAUSES OF ACCIDENTS AT SAND AND GRAVEL PLANTS IN 1930

Cause	Dry bank		Dry pit		Wet pit		Natural lake		River		Wet pit and river		Total	
	Accidents	Days lost	Accidents	Days lost	Accidents	Days lost	Accidents	Days lost	Accidents	Days lost	Accidents	Days lost	Accidents	Days lost
Machinery	14	6,350	1	234	8	6,689	3	20	5	170	1	49	32	13,512
Haulage	6	263	1	1	3	20	4	52	4	223	..	....	18	559
Explosions	..	.....	..	....	..	....	..	....	1	23	..	....	1	23
Electricity	..	.....	..	....	1	3	2	7	..	....	..	....	3	10
Fires	1	144	..	....	..	....	..	....	..	....	..	....	1	144
Hot substances	4	20	2	18	..	....	1	4	3	45	..	....	10	87
Falls of persons	5	87	1	49	3	19	1	10	12	333	4	42	26	540
Stepping on or striking against objects	8	201	..	....	1	12	3	26	7	70	..	....	19	309
Falling objects (not being handled by injured)	5	72	..	....	5	30	..	....	4	183	..	....	14	285
Handling of objects	19	570	..	....	13	297	7	77	9	165	2	63	50	1,172
Hand tools	3	9	..	....	6	73	3	8	4	24	1	7	17	121
Animals	1	28	..	....	..	....	1	50	1	2	..	....	3	80
Drowned	..	.....	..	....	1	6,000	..	....	1	6,000	..	....	2	12,000
Miscellaneous uses	3	5	2	16	2	14	..	....	7	95	..	....	14	130
Total	69	7,749	7	318	43	13,157	25	254	58	7,333	8	161	210	28,972

Portland Cement Production for August

THE PORTLAND CEMENT INDUSTRY in August, 1931, produced 13,549,000 bbl., shipped 15,172,000 bbl. from the mills and had in stock at the end of the month 24,311,000 bbl. Production of portland cement in August, 1931, showed a decrease of 24.0% and shipments a decrease of 25.3% as compared with August, 1930. Portland cement stocks at the mills were 2.0% higher than a year ago.

The statistics here presented are compiled from reports for August, received by the Bureau of Mines, from all manufacturing plants except three, for which estimates have been included in lieu of actual returns.

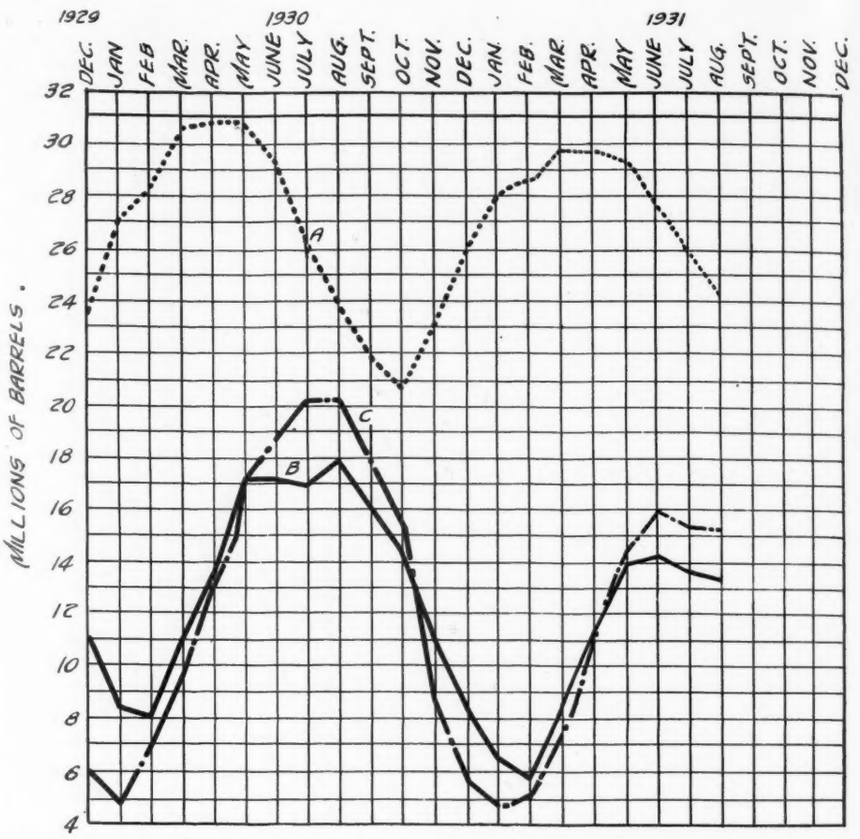
In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 165 plants at the close of August, 1931, and of 166 plants at the close of August, 1930. The estimates include increased capacity due to extensions and improvements during the period.

RELATION OF PRODUCTION TO CAPACITY

	Aug. 1930	Aug. 1931	July 1931	June 1931	May 1931
	Pct.	Pct.	Pct.	Pct.	Pct.
The month	81.0	60.2	62.0	65.4	62.8
12 months ended	65.6	52.0	53.8	55.2	56.5

Distribution of Cement

The following figures show shipments from portland cement mills distributed among the states to which cement was shipped during June and July, 1930 and 1931:



(A) Stocks of finished portland cement at factories; (B) Production of finished portland cement; (C) Shipments of finished portland cement from factories

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES IN JUNE AND JULY, 1930 AND 1931, IN BARRELS*

Shipped to	1930—June	1931	1930—July	1931
Alabama	124,375	138,369	137,184	93,076
Alaska	2,961	1,100	1,774	2,716
Arizona	41,057	41,110	34,382	41,979
Arkansas	175,644	177,846	184,225	110,421
California	843,231	646,220	846,508	540,476
Colorado	110,203	99,511	92,898	73,107
Connecticut	191,348	166,357	191,178	166,381
Delaware	59,042	51,926	68,752	42,710
District of Columbia	80,561	141,277	87,492	126,637
Florida	89,285	95,649	105,993	107,090
Georgia	142,722	183,317	147,652	159,180
Hawaii	15,182	22,996	18,164	23,770
Idaho	31,356	25,547	51,059	22,930
Illinois	1,212,319	1,069,134	1,495,891	1,054,935
Indiana	820,836	616,508	864,425	682,234
Iowa	1,126,961	779,351	1,184,588	681,197
Kansas	245,344	300,175	226,827	198,757
Kentucky	115,398	215,082	223,147	201,975
Louisiana	306,306	422,388	308,306	512,964
Maine	89,475	90,276	95,005	86,427
Maryland	267,222	230,317	274,298	186,573
Massachusetts	286,925	318,456	324,874	377,774
Michigan	1,164,439	842,129	1,253,055	908,045
Minnesota	627,906	625,439	647,064	681,655
Mississippi	51,847	82,243	66,721	69,260
Missouri	727,279	500,949	737,463	427,289
Montana	42,565	35,590	37,429	32,722
Nebraska	235,023	272,654	210,545	281,405
Nevada	16,830	11,041	15,694	9,774
New Hampshire	75,978	43,410	80,647	63,680
New Jersey	763,411	508,242	788,857	519,732
New Mexico	30,382	29,840	31,722	21,853
New York	2,331,986	2,498,158	2,474,955	2,415,239
North Carolina	111,543	163,922	108,620	126,608
North Dakota	63,127	55,251	53,178	31,587
Ohio	1,119,351	817,720	1,294,504	869,396
Oklahoma	353,241	290,304	362,973	226,890
Oregon	99,177	109,997	116,047	102,903
Pennsylvania	1,793,487	866,697	1,915,236	807,513
Porto Rico	250	17,385	8,250	5,595
Rhode Island	75,394	66,438	66,903	57,157
South Carolina	83,713	224,825	185,517	175,332
South Dakota	73,344	110,088	82,598	101,420
Tennessee	284,045	162,661	267,623	100,770
Texas	630,469	586,255	644,850	588,163
Utah	47,830	43,516	38,485	42,650
Vermont	72,329	42,905	112,145	48,958
Virginia	156,599	193,085	182,631	178,952
Washington	347,994	226,264	330,911	265,116
West Virginia	174,962	184,176	199,923	179,975
Wisconsin	751,985	569,655	810,875	611,166
Wyoming	25,877	19,781	23,380	20,863
Unspecified	5,268	1,246	0	47,943
	18,715,384	16,034,778	20,113,423	15,512,920
Foreign countries	65,616	42,222	39,577	32,080
Total shipped from cement plants	18,781,000	16,077,000	20,153,000	15,545,000

*Includes estimated distribution of shipments from two plants in June and July, 1930; from three plants in June and July, 1931.

PRODUCTION AND STOCKS OF CLINKER BY MONTHS, IN 1930 AND 1931, IN BARRELS

Month	1930—Production	1931	Stocks at end of month 1930	1931
January	10,504,000	8,129,000	9,646,000	10,384,000
February	10,008,000	7,473,000	11,572,000	11,946,000
March	13,045,000	9,586,000	13,503,000	13,318,000
April	15,025,000	11,540,000	15,164,000	13,854,000
May	16,607,000	13,159,000	14,668,000	13,087,000
June	15,895,000	12,679,000	13,452,000	11,837,000
July	15,069,000	12,246,000	11,684,000	*10,209,000
August	15,244,000	11,664,000	9,275,000	8,468,000
September	14,577,000	.....	7,783,000	.....
October	13,895,000	.....	7,266,000	.....
November	11,639,000	.....	7,758,000	.....
December	9,484,000	.....	8,809,000	.....

*Revised.

Exports and Imports†*

Compiled from the records of the Bureau of Foreign and Domestic Commerce and subject to revision.

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN JULY, 1931

Exported to—	Barrels	Value
Canada	3,679	$10,290
Central America	1,449	3,877
Cuba	3,350	7,063
Other West Indies and Bermuda	425	980
Mexico	4,614	13,777
South America	12,342	41,435
Other countries	3,635	20,573
	29,494	$97,995

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS, IN JULY, 1931

Imported from	District into which imported	Barrels	Value
Belgium	Porto Rico	4,032	$ 5,510
Canada	Maine and New Hampshire	30	117
Denmark	Porto Rico	7,593	6,528
France‡	New York‡	3,119	6,792
Japan	Hawaii	2,466	2,630
United Kingdom	New York	205	772
Total‡		17,445	$22,349

*The value of exports of domestic cement is the actual cost at the time of exportation in the ports of the United States whence they are exported, as declared by the shippers on the export declarations.

†The value of imported cement represents the foreign market value at the time of exportation to the United States.

‡Includes 3,113 barrels white nonstaining portland cement, valued at $6.767.

§Includes white nonstaining portland cement.

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII, AND PORTO RICA, IN JULY, 1931

	Barrels	Value
Alaska	2,572	$ 5,069
Hawaii	15,950	40,988
Porto Rico	5,680	7,889
	24,202	$53,946

Cast Stone Producers Fight for Award

THE QUESTION of whether granite or artificial stone will be specified for the foundation of the proposed eight room addition to the Quincy school building in Atlantic, Mass., is being considered by the council.

Chairman Carson of the finance committee declared the merits of both proposals would be considered by the council following pleas made to him by representatives of local granite and cast stone manufacturers.

In an effort to include the name of the Bianchi artificial stone company of West Quincy with the two outside firms now named in the alternate specification officials of that firm conferred with Mayor McGrath.

A delegation from the granite cutters and granite manufacturers is to confer with the mayor in their effort to obtain specification of local granite for the foundation.—*Quincy* (Mass.) *Patriot-Leader.*

Geology of Ohio

THE geology of Jefferson county, Ohio, has been published by the state geologist, Wilber Stout, Columbus, Ohio.

This 300-page book is given over particularly to the stratiography of the county and describes the occurrence and relative locations of the various deposits of limestone, clay, shale, coal, etc.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN AUGUST, 1930 AND 1931, AND STOCKS IN JULY, 1931, IN BARRELS

District	Production 1930—August—1931		Shipments 1930—August—1931		Stocks at end of month 1930	1931	Stocks at end of July, 1931*
Eastern Penn., N. J., Md.	3,676,000	2,891,000	4,161,000	3,147,000	5,509,000	5,770,000	6,026,000
New York and Maine	1,396,000	1,375,000	1,560,000	1,556,000	1,298,000	1,489,000	1,669,000
Ohio, Western Penn., W. Va.	2,009,000	1,296,000	2,338,000	1,353,000	3,190,000	3,503,000	3,559,000
Michigan	1,426,000	832,000	1,627,000	1,065,000	2,418,000	1,975,000	2,208,000
Wis., Ill., Ind. and Ky.	2,409,000	1,818,000	3,045,000	2,316,000	3,295,000	3,020,000	3,518,000
Va., Tenn., Ala., Ga., Fla., La.	1,232,000	1,193,000	1,328,000	1,082,000	1,794,000	1,687,000	1,576,000
East'n Mo., Ia., Minn., S. D.	1,933,000	1,449,000	2,491,000	1,737,000	1,937,000	2,474,000	2,762,000
West'n Mo., Neb., Kansas, Okla. and Ark.	1,361,000	987,000	1,412,000	1,121,000	1,637,000	1,490,000	1,624,000
Texas	697,000	644,000	634,000	667,000	627,000	603,000	626,000
Colo., Mont., Utah, Wyo., Ida.	302,000	209,000	292,000	232,000	509,000	585,000	609,000
California	922,000	552,000	961,000	595,000	1,105,000	1,114,000	1,158,000
Oregon and Washington	458,000	303,000	450,000	301,000	505,000	601,000	599,000
	17,821,000	13,549,000	20,299,000	15,172,000	23,824,000	24,311,000	25,934,000

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1930 AND 1931, IN BARRELS

Month	1930—Production—1931		1930—Shipments—1931		Stocks at end of month 1930	1931
January	8,498,000	6,595,000	4,955,000	4,692,000	27,081,000	27,759,000
February	8,162,000	5,920,000	7,012,000	5,074,000	28,249,000	28,612,000
March	11,225,000	8,245,000	8,826,000	7,192,000	30,648,000	29,676,000
April	13,521,000	11,245,000	13,340,000	11,184,000	30,867,000	29,715,000
May	17,249,000	14,010,000	17,224,000	14,200,000	30,891,000	29,554,000
June	17,239,000	14,118,000	18,781,000	16,077,000	29,364,000	27,602,000
July	17,078,000	13,899,000	20,153,000	15,545,000	26,289,000	*25,934,000
August	17,821,000	13,549,000	20,299,000	15,172,000	23,824,000	24,311,000
September	16,124,000	.....	18,083,000	.....	21,889,000	.....
October	14,410,000	.....	15,599,000	.....	20,697,000	.....
November	11,098,000	.....	8,784,000	.....	23,056,000	.....
December	8,480,000	.....	5,688,000	.....	25,838,000	.....
	160,905,000	.....	158,744,000	.....	.....	.....

PRODUCTION AND STOCKS OF CLINKER (UNGROUND CEMENT), BY DISTRICTS, IN AUGUST, 1930 AND 1931, IN BARRELS

District	1930—Production—1931		Stocks at end of month 1930	1931
Eastern Pennsylvania, New Jersey and Maryland	3,273,000	2,514,000	1,610,000	1,237,000
New York and Maine	1,136,000	1,019,000	496,000	600,000
Ohio, Western Pennsylvania, and West Virginia	1,511,000	1,123,000	972,000	1,100,000
Michigan	1,092,000	587,000	1,027,000	823,000
Wisconsin, Illinois, Indiana and Kentucky	1,858,000	1,479,000	1,380,000	871,000
Virginia, Tennessee, Alabama, Georgia, Florida, Louisiana	1,220,000	1,218,000	917,000	715,000
Eastern Missouri, Iowa, Minnesota and South Dakota	1,608,000	1,302,000	587,000	587,000
Western Missouri, Nebraska, Kansas, Oklahoma, Arkansas	1,279,000	817,000	285,000	461,000
Texas	701,000	633,000	299,000	310,000
Colorado, Montana, Utah, Wyoming and Idaho	342,000	181,000	270,000	258,000
California	860,000	503,000	1,004,000	1,252,000
Oregon and Washington	364,000	288,000	428,000	254,000
	15,244,000	11,664,000	9,275,000	8,468,000

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1930 AND 1931

Month	1930—Exports—1931 Barrels	Value	Barrels	Value	1930—Imports—1931§ Barrels	Value	Barrels	Value
January	82,387	$293.135	41.199	$115.678	201,609	$207,461	97,057	$132,937
February	64,267	217.798	25.703	88,989	114,455	119,717	22,370	26,250
March	117,563	357.896	54,599	144,579	43,622	59,981	70,532	80,686
April	57,419	200 217	40 478	116,564	140,871	178,226	54,717	61,728
May	57,423	198,170	48,028	140,953	94,696	111,998	20,061	22,794
June	82,077	223,639	43,619	107,977	55,356	74,370	32,080	42,955
July	47,082	166,577	29,494	97,995	12,404	20,973	17,445	22,349
August	49,031	167,579	.....	.....	35,323	39,029	.....	.....
September	46,664	153,384	.....	.....	51,096	59,721	.....	.....
October	62,690	190,305	.....	.....	75,284	84,364	.....	.....
November	50,495	151,555	.....	.....	109,124	125,448	.....	.....
December	38,680	134,260	.....	.....	44,157	59,641	.....	.....
	755,778	$2,454,515	.....	.....	977,997	$1,140,920	.....	.....

§Includes white nonstaining portland cement.

Builders to Organize for Winter Work

A CONCERTED DRIVE to promote fall and winter home building and modernizing is getting under way by the contractors and building supply men.

It is an established fact that the bulk of the nation's building business comes from the small home builders. These are the ones whom construction men are going to try to get interested in building this fall.

In no other field are the benefits of a transaction so widely spread as in construction. Not only does it put labor to work on the projects, it gives employment to material and cement producers, and manufacturers of thousands of specialties that go into the home. Increase in home building will be a strong force for better business conditions.

To Open Concrete Pipe Plant in Louisville

LOUISVILLE, Ky., will soon have a new manufacturing plant, to be known as the Independent Concrete Pipe Co., whose offices and main plant are located at Indianapolis. The company has decided to open a branch in Louisville, it was announced by city officials following the awarding of a contract to the firm for reinforced concrete pipe to be furnished the Department of Works during the next fiscal year at a cost of approximately $51,000.

The contract is for all concrete pipe the city will require for the fiscal year ending August 31, 1932. The Independent company was the lowest bidder on the pipe and was awarded the contract.—*Louisville* (Ky.) *Herald-Post.*

National Crushed Stone Association's Stand on Proposed Freight Rate Increase

ON September 16, Nuel D. Belnap, of Walter, Burchmore and Belnap, Chicago, Ill., filed the following brief with the Interstate Commerce Commission, as attorney for the National Crushed Stone Association:

"The National Crushed Stone Association, a voluntarily incorporated association of stone producers in the United States and Canada, does not appear in this proceeding for the purpose of opposing the carriers in their efforts to obtain increased revenue.

"The association is quite in sympathy with that purpose, in part from a selfish standpoint, since the members of the association sell large quantities of stone ballast to the carriers and, consequently, have a direct interest in a prompt restoration of their prosperity. An increase in rates, however, does not necessarily mean an increase in revenue. Consequently, the association participated in this proceeding and presented W. R. Sanborn, a director, regional vice-president, and chairman of the transportation committee of the association, as a witness for the purpose of acquainting the commission with the probable effect of an increase in rates upon the crushed stone traffic. Mr. Sanborn testified at the Chicago hearing and the gist of his testimony is as follows:

"The National Crushed Stone Association is willing to have the rates of its members increased, to the extent that production can stand an increase in rates without cutting down the volume of their traffic.

"Exhibit C-B-13 shows, however, that the production of crushed stone and the competing commodity, building and paving sand and gravel, in the United States, far exceeds the tonnage of these commodities which are being transported by rail carriers, and that year by year the production has increased in a substantially greater ratio than has the railroad tonnage.

"Incidentally, in connection with this exhibit it should be noted that, in so far as possible, the stone, sand and gravel production in the United States has been segregated into three divisions, *i. e.*, (1) crushed stone, sand and gravel used for concrete and road construction, this production being largely affected by truck competition, (2) crushed stone and sand and gravel used for railroad ballast, this generally being non-revenue tonnage, and (3) special purpose stone and special purpose sand and gravel, such as building stone, paving blocks, furnace flux, agricultural limestone, glass sand, molding sand, etc., this third classification, however, not being generally affected by truck competition.

"Statistics were also offered at the Washington hearing on behalf of the National Sand and Gravel Association in respect of stone, sand and gravel production, and the extent to which these commodities are transported by rail carriers (Exhibits 112 and 113), but in the exhibits just mentioned no effort was made to show those commodities in the separate divisions in which they are treated in Exhibit C-B-13. That fact accounts for the differences between the figures shown in Exhibit C-B-13 and in Exhibits 112 and 113.

"The general conclusion to be drawn from Exhibit C-B-13 is that there is a very marked trend in the case of crushed stone, sand and gravel used for concrete and road construction towards transportation by other means than rail carriers. This trend is particularly noticeable when the distribution is at short-haul points, even when from pits and quarries which have railroad connections and which were originally constructed with a view to distributing their entire output by rail. The normal trucking radius now ranges from 25 to 30 miles, and a 25-mile truck haul is not unusual, even to points where the freight rate is as low as 63 or 70 cents per ton.

"Crushed stone, sand and gravel are such low-priced commodities that the transportation cost is of more than ordinary importance. Competition compels the producer to utilize the transportation agency which affords the very lowest cost. Consequently, even under the present rate level, from 40 to 50% of the New England production is now being transported by other than rail carriers. In the remainder of official classification territory, from 25 to 35% is being trucked. In Illinois, where the stone producing points are widely separated, the truck movement is relatively low, averaging in the neighborhood of 10 to 15%.

"If the rates be increased, undoubtedly much more of the short-haul business will be taken from the rail carriers.

"It is probably true that, considered solely by themselves, the long-haul stone rates could stand a 15% increase. Unfortunately, however, if so increased, the traffic which now moves from existing quarries to long-haul consuming points will be displaced by production at wayside pits and quarries within a short trucking radius of the important consuming centers. Mr. Sanborn gave

TABLE 1. STONE—TOTAL TONS† USED OR SOLD BY PRODUCERS IN THE UNITED STATES*

Year	Crushed stone used for concrete and road metal, largely affected by truck competition	Railroad ballast, generally non-revenue tonnage (Note A)	All other stone, generally not affected by truck haul (Note B)	Total stone, short tons
1923	51,047,900	11,274,810	40,995,950	103,318,660
1924	57,684,210	10,514,230	34,985,680	103,184,120
1925	62,823,800	12,849,130	40,178,440	115,851,370
1926	66,892,530	15,623,030	41,980,800	124,496,360
1927	78,544,210	16,404,560	41,396,360	136,345,130
1928	74,384,490	16,880,870	42,604,150	133,869,510
1929	76,174,770	16,546,490	48,388,320	141,109,580
Average quarry price 1929	$1.06	$0.83	$2.25	$1.44

(Note A)—Tonnage of railroad ballast is about 20% of the tonnage used for concrete and road work.

(Note B)—All other stone in the annual reports are distributed under the following divisions: Building stone, monumental stone, paving blocks, curbing, flagging, rubble, riprap, furnace flux (flux tonnage is about half the total we have included as "all other stone"; comes mostly from Michigan, Pennsylvania and Ohio; price less than railroad ballast), refractory stone, agricultural limestone, manufacturing uses, other uses.

*Figures taken from the Annual Reports of "Mineral Resources of the United States." †Figures given show short tons.

TABLE 2. SAND AND GRAVEL—TOTAL TONS† SOLD OR USED BY PRODUCERS IN THE UNITED STATES*

Year	Building and paving sand and gravel, largely affected by truck competition	Railroad ballast and engine sand, generally non-revenue totnnage (Note C)	Special purpose sands, generally not affected by truck haul (Note D)	Total sand and gravel, short tons
1923	105,186,756	24,280,801	10,464.596	139,932,153
1924	121,401,510	23,365,773	11,462,780	156,230,063
1925	135,497.775	21,747,165	14,756,533	172,001,473
1926	141,658,970	24,487,478	16,954,370	183,100,818
1927	151,668,005	31,160,814	14,625,450	197,454,269
1928	164.709.772	29,958,173	14,450,923	209.118.868
1929	174,440,968	33,159,818	14,971,119	222,571,905
Average pit price 1929	$0.61	$0.33	$0.99	$0.60

(Note C)—Railroad ballast and sand about 20% of B and P, G and S.

(Note D)—Special purpose sands in the annual reports are distributed in the following divisions: Glass sand, molding sand, grinding and polishing sand, fire or furnace sand, filter sand, other sands.

*Figures taken from the Annual Reports of "Mineral Resources of the United States." †Figures given show short tons.

TABLE 3. TONS OF STONE, SAND AND GRAVEL SOLD OR USED IN THE UNITED STATES,* 1923–1929

Year I	Stone (From Table 1) II	Sand and gravel (From Table 2) III	Total stone, sand and gravel IV	Pct. change for each sucessive year as compared to 1923 V
1923	103.318.660	139,932,153	243,250,813	100%
1924	103,184,120	156.230,063	259.414.183	107%
1925	115,851,370	172.001,473	287,852.843	118%
1926	124.496,360	183,100,818	307.597.178	126%
1927	136.345.130	197.454.269	333,799.399	137%
1928	133.869.510	209,118.868	342.988.378	141%
1929	141.109.580	222.571.905	363,681,485	150%
1930	(Note E)	(Note E)		

(Note E)—Report not yet available.

*Data compiled from reports of U. S. Geological Survey and U. S. Bureau of Mines.

TABLE 4. TONS OF STONE, SAND AND GRAVEL TRANSPORTED BY RAILROADS,* 1923–1930

Year I	Carloadings II	Carloadings converted to tons, using 50 tons as average load per car over period in question III	Per cent. change for each successive year, as compared to 1923 IV
1923	2,062,355	103,117,750	100%
1924	2,195,926	109,796,300	106%
1925	2,382,311	119,115,550	115%
1926	2,620,069	131,003,450	127%
1927	2,741,522	137,076,100	133%
1928	2,667,160	133,358,000	129%
1929	2,593,575	129,678,750	126%
1930	2,224,095	111,204,750	108%

*Data from reports of the American Railway Association.

TABLE 5. COMPARISON OF TONS OF STONE, SAND AND GRAVEL TRANSPORTED BY THE RAILROADS WITH TONS OF STONE, SAND AND GRAVEL SOLD OR USED IN THE UNITED STATES, 1923–1929

Year I	Stone, sand and gravel, sold or used (From Table 3) II	Sand and gravel and stone transported by the railroads (From Table 4) III	Percentage of total sand and gravel and stone sold or used transported by railroads IV
1923	243,250,813	103,117,750	42.4%
1924	259,414,183	109,796,300	42.4%
1925	287,852,843	119,115,550	41.4%
1926	307,597,178	131,003,450	42.5%
1927	333,799,399	137,076,100	41.0%
1928	342,988,378	133,358,000	38.8%
1929	363,681,485	129,678,750	35.7%

TABLE 6. COMPARISON OF REVENUE TONNAGE, CRUSHED STONE, SOLD OR USED IN THE UNITED STATES, WITH REVENUE TONS ORIGINATED BY CLASS I RAILROADS

Year I	Tons of crushed stone sold or used in the United States* II	Revenue tons of stone (broken, ground or crushed) originated by Class I railroads† III	Per cent. originated by Class I railroads IV
1928	74,384,490	35,466,459	48%
1929	76,174,770	33,529,078	44%
1930	(Note F)	31,826,185	.....

(Note F)—Figures not available.
*From reports of U. S. Bureau of Mines (excluding railroad ballast).
†From Interstate Commerce Commission freight commodity statistics.

TABLE 7. COMPARISON OF REVENUE TONNAGE, SAND AND GRAVEL,* SOLD OR USED IN THE UNITED STATES, WITH REVENUE TONS ORIGINATED BY CLASS I RAILROADS

Date	Total revenue tons of sand and gravel,† excluding glass and molding sands. Also excluding railroad ballast and railroad sand	Revenue tons, originated by Class I carriers of gravel and sand‡ (other than glass or molding)	Per cent. originated by Class I railroads
1928	172,068,102	85,667,157	50%
1929	180,997,067	81,408,069	45%
1930	(Note G)	73,983,884	

(Note G)—Report not yet available.
*Excluding glass and molding sands.
†From reports of U. S. Bureau of Mines.
‡From Interstate Commerce Commission freight commodity statistics.

numerous illustrations of how even the present rate level has induced the opening of such wayside pits and quarries.

"Because of these circumstances, there is a serious question in the minds of the members of the association as to whether or not a general increase in rates would actually result in an increase in net revenues.

"In the event, however, that the commission is disposed to permit the increases to be made, there remains for consideration these questions: (1) How should the increase be provided, by a flat amount in cents per ton or by a percentage method? (2) Should the increase be the same for all competing commodities? And (3) should the carriers be permitted to take only so much of the increase as in their judgment they would be able to take and still hold the traffic to the rail lines?

"Upon these three questions Mr. Sanborn expressed the following as the views of the association:

"The increase, if made, should be by the percentage method, thus avoiding the maladjustment of rates which followed U. S. R. A. General Order No. 28 when all crushed stone, sand and gravel, but not crushed slag, rates took at flat 20-cent per ton increase. The percentage method is particularly desired if the increase authorized be the full 15%. If only a nominal increase is authorized, as for example, the equivalent of 5 cents per ton on all stone rates, perhaps the flat increase would then be preferable.

"As to competing commodities, crushed stone is used for the same purposes as gravel and crushed slag. Whatever may be the character and amount of the increase, it should be applied uniformly to all three of these competing commodities.

"As the carriers appreciate, there are a great many rates on crushed stone which cannot stand any increase at all if the rail carriers are to be in a position to retain the traffic. Accordingly, the association urges that, if an increase be authorized, the carriers be granted specific authority to apply only such part of the increase as in their judgment they may be able to take and still hold the traffic to the rail lines."

Urge Public Jobs to Prevent Doles

PUBLIC IMPROVEMENTS of a permanent nature, with local communities assuming the task as much as possible, was unanimously urged at the recent conference on unemployment held in Washington, D. C., under the auspices of the National Employment Commission of the American Legion, according to returning delegates.

The official representatives of cities and states in attendance heartily endorsed the American Legion program which calls for the speeding up of public works through which approximately three-fourths of the money spent for construction goes into the pockets of labor. The conference, including Legion delegates and invited city and state officials, were in agreement that public works provided by government agencies should be of a permanent nature, assuring taxpayers of their money's worth.

Emphasis was placed by the conference on local responsibility. Every community, no matter how large or small, should endeavor to solve its own problem of unemployment by getting busy on projects of immediate need or of value in the near future, it was agreed. With every community extending itself to meet its own difficulties, the seriousness of the problem as a whole would be lessened.

Representatives of several states presented evidence to show that the local initiative had already made noteworthy progress. Oklahoma, Louisiana, Connecticut, Oregon, South Carolina, New Mexico and Massachusetts reported that they would be able to take care of their own unemployed because of careful local public improvement planning. New York also is making plans that will permit her to face the coming months without outside help.

Another point emphasized by the conference was that the unemployed remain in their home communities. Most centers cannot afford to plan for care of transients.

The conference was marked with optimism. As state after state reported that their unemployment problem was being brought under control by carefully planned programs of public works, added vigor was given to the program of the American Legion in support of needed public improvements as the most practical way of supplying speedy relief.

Potash Found in New Mexico

THE DEPARTMENT OF the Interior announces that the Geological Survey has completed the analyses of the cores from government test holes drilled in Lea and Eddy counties, New Mexico, by the Bureau of Mines under the potash act, which provides for joint explorations by the Department of the Interior and the Department of Commerce. Polyhalite ($K_2SO_4 \cdot MgSO_4 \cdot 2CaSO_4 \cdot 2H_2O$), carnallite ($KCl \cdot MgCl_2 \cdot 6H_2O$) and sylvite (KCl) were found in each core. Several beds of polyhalite that may have potential commercial value were found. The principal discovery, however, was a 5-ft. bed of sylvinite (halite and sylvite) at a depth of 691 ft., which contains the equivalent of 30.75% of K_2O. This bed compares favorably with the bed now being mined in New Mexico and with the best of the potash salts being mined abroad. It is overlain by another 5-ft. bed of halite and sylvite that contains the equivalent of 8.8% of K_2O and could perhaps be utilized in part in mining. Detailed information on the results of these analyses is now available.

Survey Gives Agricultural Limestone Production Costs

AGRICULTURAL LIMESTONE may be quarried and ground at local Missouri quarries for an average cost of $1.67 per ton according to a recent survey of 109 quarries throughout the state made by O. T. Coleman of the Missouri College of Agriculture. A study made in 1922 gave a figure of $2.05 per ton for local quarrying and grinding the present cheaper figure resulting from cheaper labor, the use of more efficient machinery, and a knowledge of better methods.

The average figure of $1.67 per ton is made up of 79c. for labor and power to grind; 63c., labor and dynamite to quarry rock, and 25c. for repairs and depreciation on machinery. The average amount actually crushed per hour was reported as 3.3 tons. The average age of the crusher used was reported as 5.3 years. The average amount of stone one set of hammers will grind was reported at 1420 tons, while 1580 tons was reported as the total amount per crusher. The average distance from a railroad was reported as 7 mi. It is significant that of the 109 crushers studied, 98% of the owners believe that grinding on the farm is practical.—*Puxico* (Mo.) *News.*

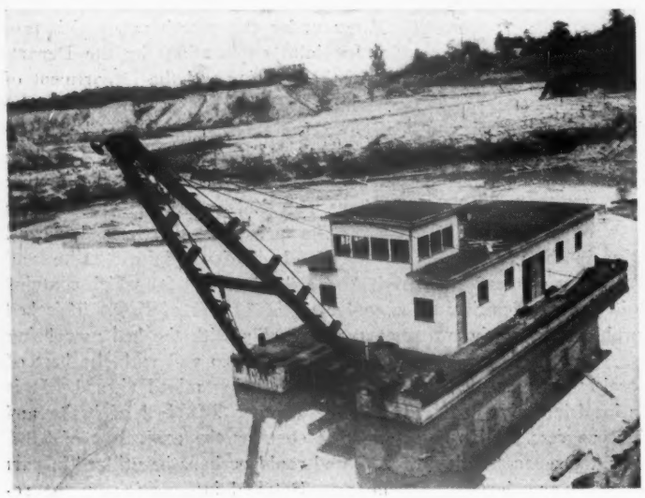
Callaghan Co.'s Dredge Again Ready for Service

THE "W. T. ROSSITER," an 18-in. suction dredge of the M. A. Callaghan Co., sand and gravel producer, Cleveland, Ohio, has been completely rebuilt and is once more ready for service. There are many readers of Rock Products who probably remember reading the description of this boat when it was first put into service, back in July, 1924, and who later read Rock Products' report of it having been struck by lightning and destroyed the following year.

Following the fire the dredge was put in dry dock, where it stayed until recently, when it was decided to rebuild it. Practically the only part salvaged was the pump, an 18-in. Morris. It was necessary to build a complete new hull and this is made up of full length virgin timber.

Formerly the pump was driven by a 450-hp. motor; it is now driven by a 500-hp. General Electric slip-ring motor, and the boat is now capable of pumping from 8 to 10 cars of material per hour, depending upon conditions. A feature of the rebuilt dredge is its modern electrical control equipment which provides the utmost in simplicity.

Although the dredge is ready to operate, it has not been started due to business conditions.



Dredge "W. T. Rossiter"

North Carolina Mineral Group Meets

A SESSION of the Southern Appalachian Mineral Society, a miners' day celebration, contests and hundreds of exhibits of products of mines, mills and farms held the interest of thousands of western North Carolinians on the final day of the 18th annual Toe River fair.

Among the members of the society who were present were William Colburn of Biltmore Forest; Dr. Joseph Stuckey, assistant state geologist; Harry Davis, director of the state museum, Raleigh, and Dr. Schaller of Washington, D. C., an authority on pegmatite dykes in which feldspar and mica are among the minerals found.

In addition to visiting the exhibits, members of the society were taken to the McKinney mine of the Carolina Mineral Co. to witness a blast.—*Asheville* (N. C.) *Times.*

Report on Proposed Public Construction in 1932

ALL PRODUCERS and manufacturers are interested in the size of highway programs for next year. Replies from 44 state highway commissions to a questionnaire by the American Road Builders Association estimating their expenditures for 1932 indicate that slightly more money will be spent in the states in 1932 than in 1931, the amount of increase depending somewhat on federal aid and increased emergency funds.

Replies from over 100 cities have indicated that the expenditures in cities will be slightly more in 1932 than in 1931.

Recent information on county programs indicates a reduction.

Fred R. Kanengeiser Returns to Cement Industry

FRIENDS of Fred R. Kanengeiser in the rock products industry—and they are legion—will be made happy to know that he is returning to the fold as president of the Wellston Iron Furnace Co., Jackson, Ohio, manufacturers of "Superior" brand portland cement, and of masonry and other special cements, effective October 1.

Fred Kanengeiser was formerly vice-president and general manager of the Bessemer

F. R. Kanengeiser

Limestone and Cement Co., Youngstown, Ohio. He was an active member and a director of the Portland Cement Association and of the National Crushed Stone Association, and universally popular. He has also been a vice-president of the Metropolitan Paving Brick Co., Youngstown.

Mr. Kanengeiser is a graduate of Case School of Applied Science, Cleveland, Ohio, and ranks high as an engineer. His earliest experience was in the steel industry. Since selling his interests and retiring from the Bessemer Limestone and Cement Co. he has been interested in strip coal mining.

County to Condemn Gravel Pit

CONDEMNATION of a gravel pit in Cannon Falls township, Minnesota, has been started by County Attorney Ofstedahl upon the authority of the county board of commissioners. The county wishes to use the pit when it regravels county roads. The defendant wants 10c. a cu. yd. for the gravel. The county board offered 6c.

The county never pays more than 10c. a yard for its gravel, and that price goes to pit owners where the gravel can be reached with little inconvenience and is of a high grade.—*Red Wing* (Minn.) *Eagle.*

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Central Batching Plant With Electric Eyes

Cranford Co., Brooklyn, N. Y., Uses Latest Automatic Features

By E. J. Patton*

ALTHOUGH only a few years old, central mixed concrete has won the respect of engineers, contractors and architects throughout the country. This is no doubt largely due to the foresight of the pioneer producers in striving for and establishing a reputation for unvarying quality.

At least one successful proportioning and mixing plant will be found in practically every growing city of over 100,000. In some cases these plants are operated in connection with building supply yards. In many cases, gravel and crushed stone producers are operating central mix plants as a new outlet for their product. In a few locations, where competition is keen, ready mixed concrete has been the salvation of the more progressive gravel and stone producers.

It is only natural that architects and contractors responsible for important jobs should favor concrete proportioned and mixed in well equipped central plants. Such concrete is made under favorable conditions, proportioned exactly to specification and with normal handling is certain to develop a definite strength. Thus the architect is relieved of a large responsibility by the ready mixed concrete producer.

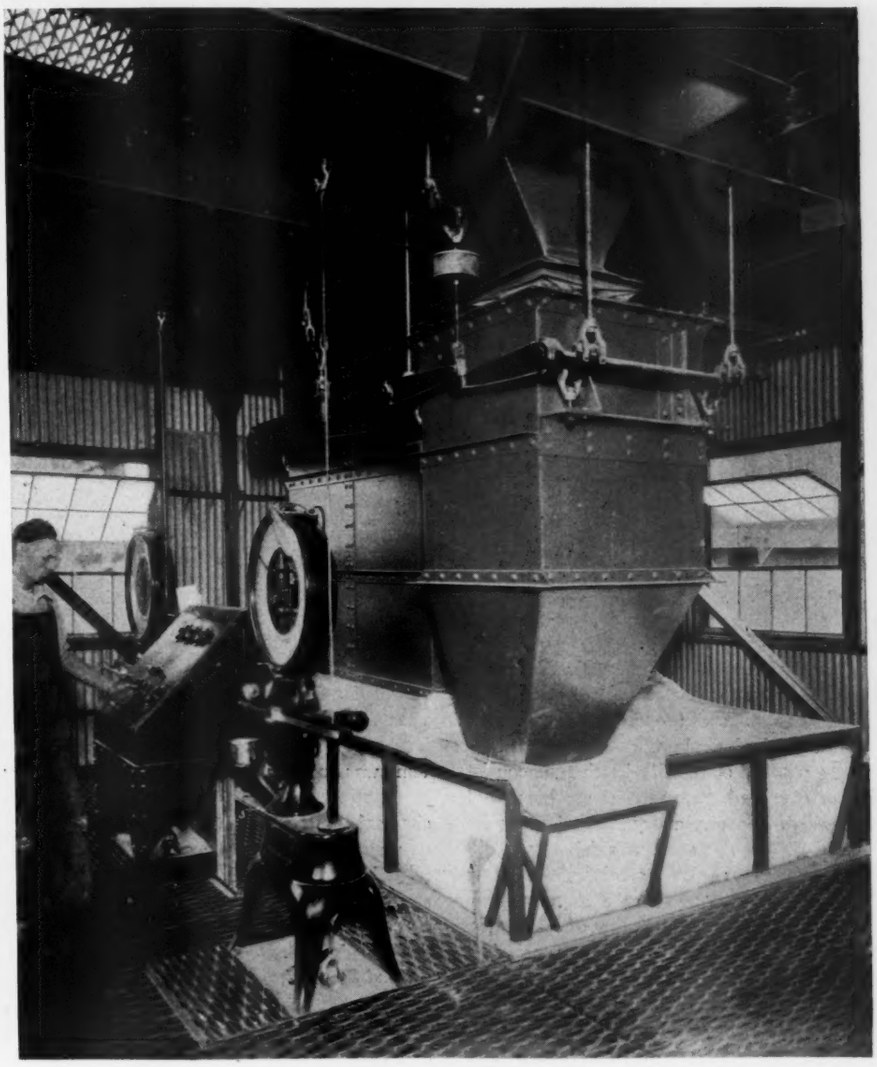
Rapid Development in Methods

Central mixed concrete has seen a rapid development in means and methods. At first the methods were admittedly crude. Mixtures were proportioned volumetrically by rule of thumb and the resulting concrete was anything but uniform. But now the ingredients are accurately proportioned by weight. As a result, concrete of high strength and uniform quality is produced, so that the previously high safety factors are unnecessary and lighter, stronger concrete construction is obtained at lower costs.

Among the new plants of this type is that just completed by the Cranford Co. at Brooklyn, N. Y. This firm has operated in the Brooklyn territory for nearly 25 years and has built a reputation for being "first in its territory." Besides laying the first asphalt pavement in Brooklyn, J. P. Cranford, the founder of the firm, with N. B. Abbott, is credited with paving the first asphalt street in the United States.

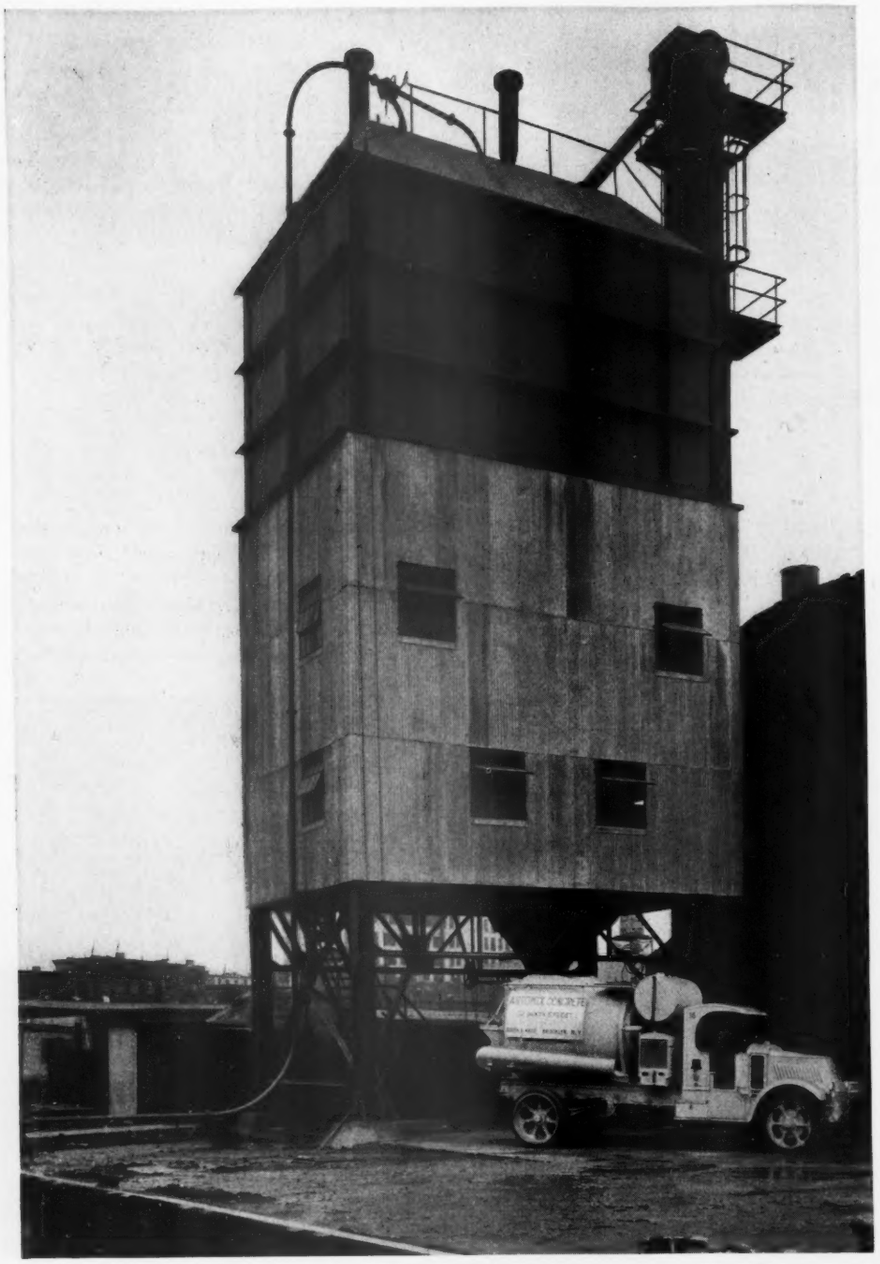
The Cranford Co. is again first with a plant equipped for automatic photoelectric cell (electric eye) control to produce concrete mixtures of absolutely uniform proportions and strengths.

The plant and control system were designed by the Stephens-Adamson Mfg. Co., Aurora, Ill., and the control system was fur-



Control room, showing control panel, dial scales and weighing hoppers, with batch hopper below covered to confine dust

*Stephens-Adamson Manufacturing Co., Aurora, Illinois.



General view of batching plant with cement bins at left and sand and gravel elevator at right

nished by the General Electric Co. This system centers about a control panel from which one man can operate every unit in the proportioning plant.

The plant is of the dry batch type consisting of overhead material storage bins, feeders, weigh hoppers, a dry batch hopper and a fleet of 4½-yd. transit mix delivery trucks. These trucks are Jaeger mixing bodies on Mack truck chassis. After a detailed study of local conditions this type of plant was favored over the central mix type. The average haul was found to be long enough to require mixing of the batch en route.

The plant is located on the Gowanus canal and the raw materials are received in 700-ton barges. Cement is handled to overhead bins by a Fuller-Kinyon pump, investigation showing that because of a 5 ft. rise and fall of water level, the pump system was preferable to a strictly mechanical system. A two-compartment cement bin enables the storage of two different kinds of cement if desired.

Sand and gravel are unloaded by a crane and clamshell bucket to a belt conveyor leading to the yard storage bins adjoining, or to a receiving hopper at the new batching plant. Barges can be unloaded at the rate of 200 tons per hr. to the yard storage bins or 100 tons per hr. to the batching plant. Ordinarily material is unloaded to the yard storage bins and reclaimed back to the batching plant hopper by belt conveyor as needed.

A Stephens-Adamson belt feeder 24 in. wide by 16 ft. 6-in. long, with a capacity of 100 tons per hr., withdraws aggregate from the receiving hopper at the batching plant and feeds it to a 16-in. bucket elevator. This elevator, which is 84 ft. long, carries up to a four-compartment sand and gravel storage bin. The discharge spout can be set to discharge sand to either of two compartments and gravel to the two remaining sections.

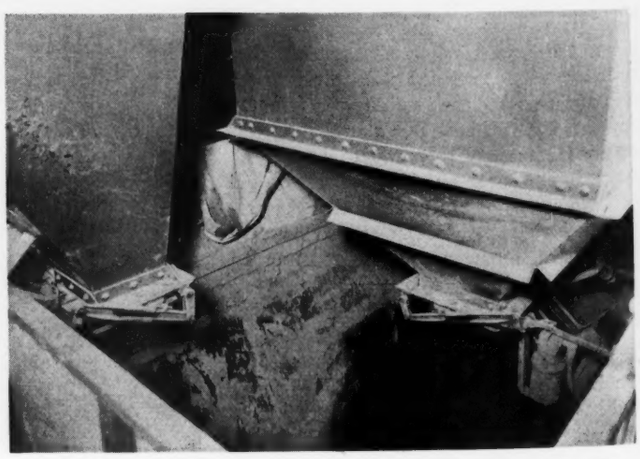
An automatic signaling system warns the operator when any bin is almost filled. As the material nears the top, a swinging paddle is pushed aside and sounds an alarm horn in the control room. The operator then knows that he has just enough space left to hold the load already on the conveyor and elevator, and must switch to another bin.

Batching

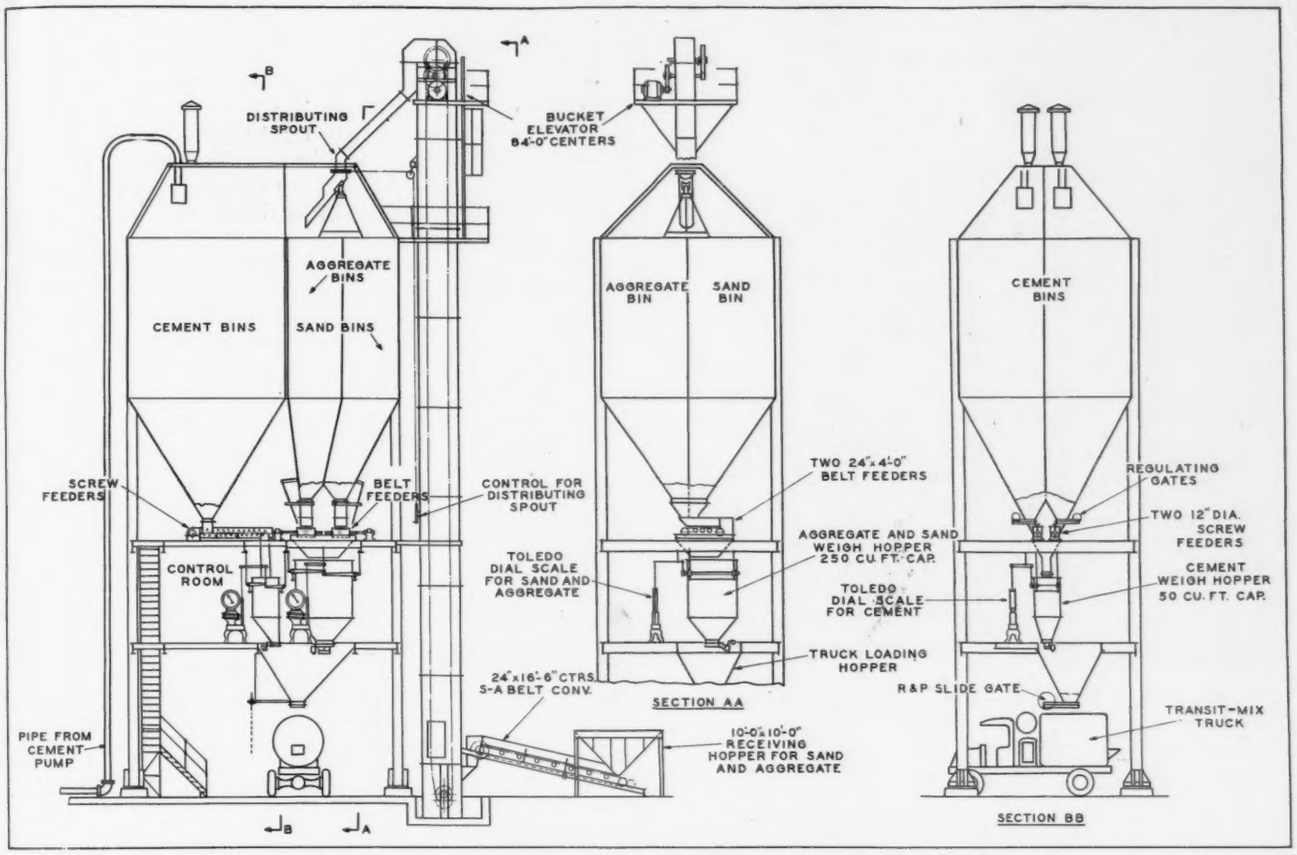
Cement is drawn from either of the two storage compartments by either of two 12-in. triple-threaded special screw conveyors beneath. The feed is slow and uniform and the cement weigh hopper can be charged exactly according to the setting on the dial scale in the control room.

Sand and gravel are fed from separate compartments by two S-A belt feeders, each 24 in. wide. These feeders discharge, one at a time, into a single weigh hopper and are controlled by a second dial scale.

This weighing and proportioning is interesting as being the first installation of photo-electric cells or "electric eyes" built into dial scales to insure absolute uniformity and eliminate the human error in weighing. Two Toledo dial scales are used, one for aggregate and sand and another for cement. Each



Looking into batching hopper with dust cover removed. Note gates operated with push button



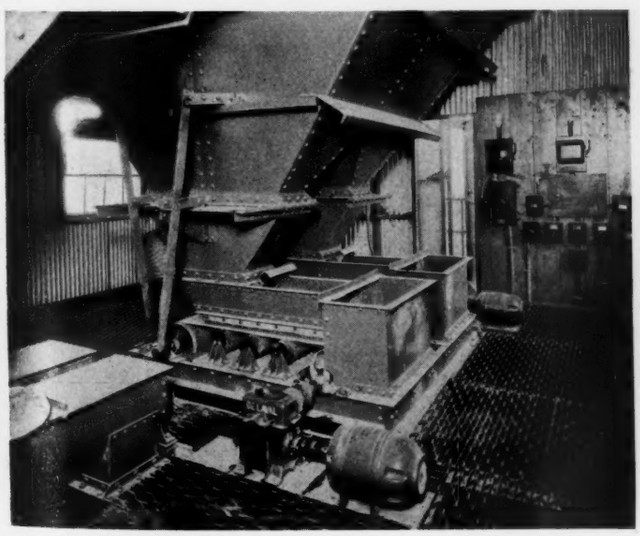
Conveying, elevating and weighing equipment in plant of Cranford Co., Brooklyn, N. Y.

is fitted with an "electric eye" which instantly stops the feeder when the scale pointer registers the desired weight.

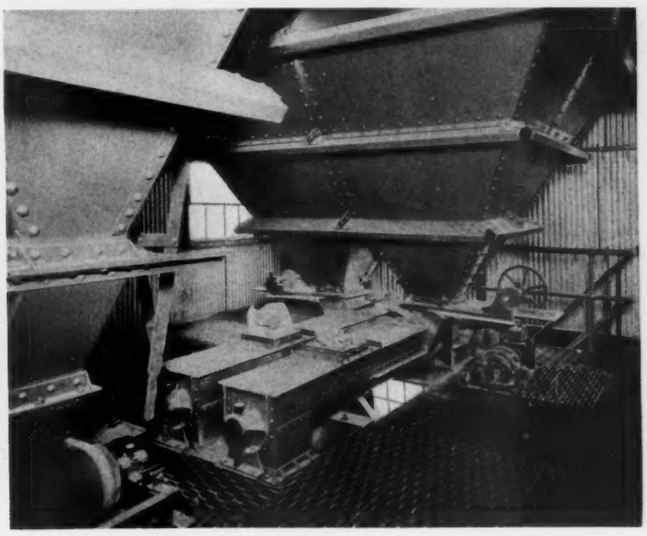
There is no guesswork on the part of the operator and no chance for over or under weights. Instead of watching dials like a hawk and stopping feeders by hand, the operator has more time for other things, such as more frequent tests on materials, adjustments for increase or decrease in moisture content of sand and aggregate, etc.

As shown in one of the illustrations, the control panel has a push button for each conveyor, feeder and dump gate and also a pilot light to show the operator just what is happening to the unit. In the case of conveyors the lights remain red as long as the unit is delivering, while for gates the light is red until the gate is closed and ready for a new charge. The controls are also interlocked to avoid flooding any one unit.

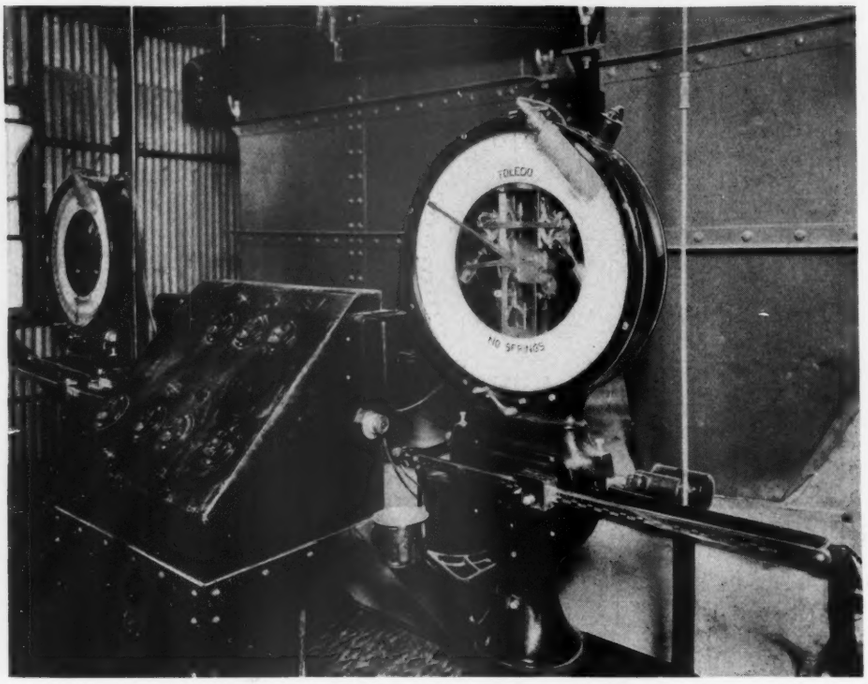
In weighing a batch, the operator sets the dial of the cement scale for the desired charge. He glances at the control panel to make sure the dump gate in the cement weigh hopper is closed. He then pushes the button that starts the cement feeder. Cement



Sand and gravel are fed by two short belt feeders whose motors are automatically stopped by the photo-electric cell



Cement is fed by either of the two screw conveyors. These motors are also stopped automatically by the photo-electric cell



Control panel and two dial scales equipped with photo-electric cell

is fed into the weigh hopper beneath and gradually the scale pointer swings around toward the desired weight. The instant it reaches the proper weight it cuts the beam of light that shines into the electric eye. The cell in turn trips a relay and stops the motor and the flow of cement instantly.

Sand and gravel are fed into a second weigh hopper in the same way. The operator sets the dial and starts the sand feeder just as soon as he has started the cement. Without any further attention the electric eyes will stop the feeders at exactly the right instant.

Although it might be supposed that the amount of material suspended in mid-air between feeders and weigh hoppers, after the scale had stopped the feeders, might be variable enough to affect the accuracy of the mix, this was not found to be the case, as the feeders were especially designed for the purpose.

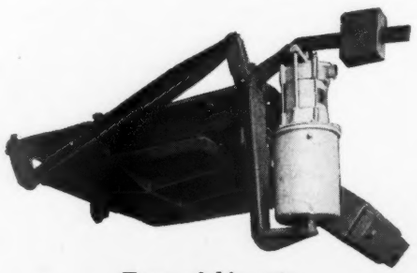
The cement feeders consist of triple-threaded screw conveyors driven at slow speed by DeLaval worm gear speed reducers and General Electric motors equipped with solenoid brakes, so that the flow of cement is stopped the instant the "electric eye" shuts off the cement.

The two belt feeders for sand and gravel were carefully designed to deliver such a constant volume that there is practically no variation from the required proportion set on the dial of the scale.

As a further check on accuracy, each scale not only stops the feed of material into its weigh hopper, but also shows the exact amount of material that has been delivered. Thus the operator can see at a glance that the weight in the hopper is exactly what is wanted.

Although not now provided, the system can be equipped with an automatic recorder to print a record of the actual weight of each ingredient for every batch produced.

Both the cement and the aggregate weigh hoppers are equipped with remote control dump gates as shown in one of the illustrations. These are cement-tight and are dumped by means of push buttons in to the batch hopper below. These gates were especially designed and are connected to and operated by G-E thrustors. The thrustor is a new device recently brought out by the General Electric Co. to obtain a thrust motion or reciprocating motion from a small push button operated motor. It consists of a centrifugal pump in a cylinder and connected with the motor in such a way that a liquid is forced through from one side to the other and a plunger rod is moved up or down.



Type of bin gate

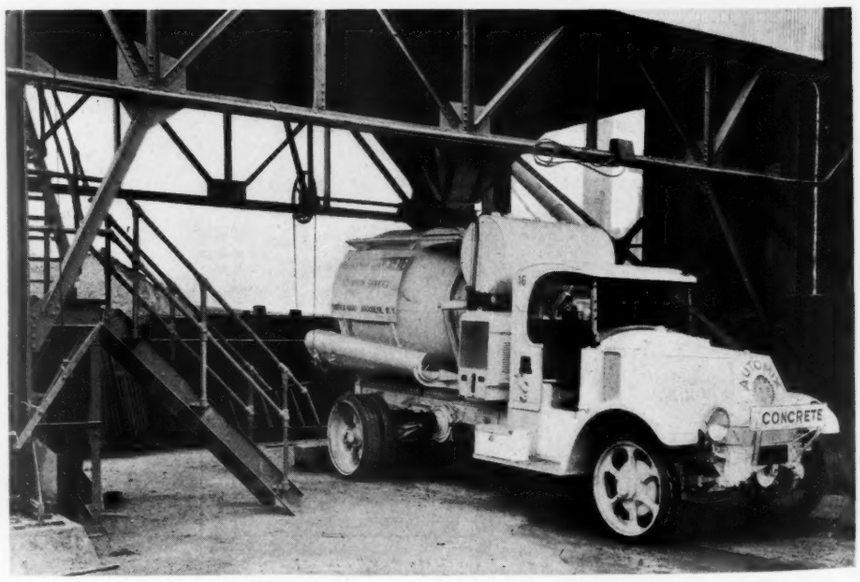
The charges from the weighing hoppers fall to the batch hopper below, from which the material is drawn into the trucks by means of a rack and pinion slide gate. The batch hopper has a canvas cover to confine the dust.

Water is added to the truck tank from a calibrated tank above and mixing is done en route to the delivery point.

The advantages seen in this new automatic weighing and control system are increased accuracy and uniformity along with lower production cost. By eliminating guesswork and uncertainty in the proportioning of the aggregates and thus insuring uniform high strength concrete it should be possible to reduce the cost of concrete construction by reason of the less bulk required for a given strength and the reduced inspection necessary on the job.

Bids for Dredge Asked

BIDS for the rental of a sand and gravel dredge were invited by the Memphis engineer district recently. The dredge will furnish sand and gravel in connection with revetment work in the vicinity of Caruthersville, Mo., for not less than two nor more than 12 weeks.



One of the 4 1/2-yd. transit-mix trucks being loaded

Commission Agrees on Law for Leasing of Muscle Shoals

ACCORDING to an oral statement by a member of the Muscle Shoals Commission, that body has agreed in principle on a form of legislative authority to govern the making of contracts for the leasing and operation of the government plants on the Tennessee river.

The Muscle Shoals Commission will meet at Muscle Shoals, Ala., October 1, at which time it is expected that some final solution of the Muscle Shoals problem will be forthcoming.

The commission is reported as favorable to the idea that the enormous plants at Sheffield and Russellville, Ala., should be used for the aid of agriculture. If the recommendations of the commission meet with the approval of Congress the nitrate plant probably will be put in operation again.

The project has been visited by members of Rock Products staff several times since its inception in 1917 and a complete description of the operations was published in the issues of July 5 and July 19, 1919. The following information relative to the project is from these records and from later personal observations.

The limestone crushing plant at Russellville has been maintained in first class condition and the operation of that part of the project could be started within a week or two.

In 1917, when the Air Nitrates Corp. was formed and the lime plant built at Muscle Shoals, the limestone for burning into lime was secured near Rockwood, Tenn. Later the government completed a 1200-ton per day stone crushing plant at Russellville and a considerable acreage of stripping was removed from the quarry site, but no stone was ever put through the plant. This crushing plant is of interest, as its primary breaker is a set of Edison rolls.

The lime burning plant at Sheffield contains seven 8-ft. by 126-ft. rotary kilns and was designed to produce 500 tons of burned lime per day. This output was expected to be obtained from five kilns, as two were reserve units.

Cyanamid, the stable nitrogen compound which the Air Nitrates Corp. intended to produce at this plant, is made by treating calcium carbide at a white heat with nitrogen gas. The nitrogen is obtained from the distillation of liquid air.

The carbide is made by treating burned lime and coke in an electric furnace and it was to supply this needed lime that the lime burning plant and the quarry with its crushing and screening plant were developed.

The carbide plant contained 12 furnaces for the production of calcium carbide, each requiring roughly about 10,000 hp. to operate and with a capacity of 300 tons of carbide per day. For the treatment of the carbide with nitrogen gas there were 1536 ovens, of which 1000 were to be in continuous operation.

The liquid air plant was five times the size of any in existence at that time. The power house contained eight generators capable of producing 260,000 hp.

To insure an adequate supply of water and power to operate this mammoth enterprise calls for the construction of a second dam 16 mi. above the present Wilson dam. This dam would be 50 ft. high and have a length of 1¼ mi. The construction of this dam is anticipated with the inauguration of operations at Muscle Shoals.

Lowell M. Palmer, Jr.

LOWELL M. PALMER, Jr., former president of the Palmer Lime and Cement Co., York, Penn., and of its successor, the Universal Lime and Gypsum Co., Chicago, Ill., died at his home in New York City, September 11, after an illness of two and a half years. He was 53 years old. He retired from business in 1927.

Photo by Blank and Stoller, New York

Lowell M. Palmer, Jr.

Mr. Palmer was the son of the late Lowell Mason Palmer, prominent 20 years ago as a director in the American Sugar Refining Co., the Manhattan Life Insurance Co. and other important corporations.

Surviving is his wife, Mrs. Madeleine Chantiot Palmer, and a brother, Carlton Palmer, president of Squibbs, Inc.

Caldwell C. Cartwright

ON SEPTEMBER 8, Caldwell C. Cartwright, president of the Mid-West Crushed Stone Co., Indianapolis, Ind., died at his home in Portland, Ind.

Mr. Cartwright had long been active in the crushed stone industry. He was a director of the National Crushed Stone Association, chairman of its committee on cost accounting and had devoted much time to safety work in the quarry industry. He had served as chairman of the quarry section of the National Safety Council, as well as chairman of the Crushed Stone Association's safety committee.

He had other business interests in Indiana and was well known in Indiana Masonic and musical circles.

Interesting Comment on Unemployment

UNEMPLOYMENT is a matter of vital concern to every individual and also to every business organization. An excellent thought on this subject has been given in a statement by the Illinois Powder Manufacturing Co., St. Louis, Mo., to each of its employes without comment for such independent action as they may determine best for themselves and in accordance with their own right as they understand the right.

This statement has also been prepared and given limited distribution and reads in part as follows: "A victim of an accident finds many willing hands. Is not involuntary unemployment an accident? Why not an endless chain suggestion passed on to the more happily circumstanced, that they succor the helpless victims of this unhappy economic situation? Why pass the 'buck' to George or squabble about methods? The victim is 'confronted with a condition and not a theory.' We should not rape charity in the use of coercion or pressure by the whip of authority. Charity or good will without free will is no benevolence at all. Remember the circumstances of some in employment may be worse than those of many more provident people out of employment.

"If you like the idea, resolve to do your bit and become a link in a chain that with a slight effort on your part may open the flood gates of mercy where you least expect. In all cases, let each man's conscience be his guide."

Statistics on Commodities

THE Special Libraries Association, a national organization composed of research workers and the librarians of important business corporations throughout the country, announces the publication of "Statistics on Commodities." This is a chart, 22-in. square, which is a key to the statistics published regularly in business and trade magazines. By means of symbols, the chart shows at a glance which magazines publish prices, production, sales, exports and imports for each commodity. Seventy-seven important magazines have been analyzed as sources of information on 104 basic commodities.

Sand-Lime Brick Production and Shipments in August

THE FOLLOWING DATA are compiled from reports received direct from 22 producers of sand-lime brick, located in various parts of the United States and Canada. The number of plants reporting is one more than for the July estimate, published in the August 15 issue. The statistics below may be regarded as representative of the entire industry in the United States and Canada.

Reports for the month of August indicate that production remains about the same as in the previous month, one producer reporting "plant closed" and four reporting "no production." Rail shipments show an increase while truck shipments remain about the same, as do stocks and unfilled orders.

Average Prices for August

Shipping point	Plant price	Delivered
Dayton, Ohio	$11.50	$12.50
Detroit, Mich.	.....	14.50
East Windsor, Ont., Can.	14.50	.....
Flint, Mich.*	.....	a13.50-15.00b
Grand Rapids, Mich.	.....	13.50
Jackson, Mich.	13.00	.....
Madison, Wis.	12.50	14.00
Milwaukee, Wis.	10.00	11.00-12.50
Minneapolis, Minn.	8.50	10.50
Mishawaka, Ind.	10.00	.....
Pontiac, Mich.	11.50	13.50
Saginaw, Mich.	12.00	.....
Sioux Falls, S. D.	.....	13.00
Tampa, Fla.	8.50	.....
Toronto, Ont., Can.	10.90	12.00

*Less 5%. (a) For orders over 25,000 brick. (b) For orders under 25,000 brick.

Statistics for July and August

	*July	†August
Production	5,518,386	5,989,061
Shipments (rail)	528,980	805,000
Shipments (truck)	5,423,821	5,505,524
Stocks on hand	10,199,107	10,697,804
Unfilled orders	10,710,000	10,838,000

*Twenty-one plants reporting, including the figures from one plant which did not report in time for the figures published in our August 15 issue. Incomplete, eight not reporting unfilled orders.

†Twenty-two plants reporting; incomplete, two not reporting production and nine not reporting unfilled orders.

Notes from Producers

Sioux Falls Pressed Brick Co., Sioux Falls, S. D., reports that it has received an order for 120,000 brick to be used for the local post office addition.

Wisconsin Brick Co., Madison, Wis., is installing a dragline for its sand pit, and will furnish the brick for the East Side high school addition of its city.

Northern Indiana Brick Co., Mishawaka, Ind., is mailing a very attractive looking circular, describing and picturing the offices and factory of The Kawneer Co., Niles, Mich., for which the company's sand-lime brick was used.

Refractories Institute to Meet

THE American Refractories Institute will hold its regular fall meeting October 8-9 in the Hotel Cleveland, Cleveland, Ohio.

Florida Chamber of Commerce Backs "Florida Materials" Program

UTILIZATION of Florida materials in the construction of public buildings and other projects throughout the state is meeting with general approval of the public as well as the contractors. This was revealed by the Florida state chamber of commerce following a check covering a period of nearly two years and reported through the executive committee of that body.

Commendation was given the state road department for its use of Florida materials.

In a resolution passed more than a year ago the board of directors of the state chamber urged the use of Florida materials, such as cement, stone, lime rock and other products by builders wherever possible.

A manifestation of this effort on the part of Florida citizens to cooperate with and assist Florida industry comes through the state highway body. As a result a resolution was passed at a recent meeting of the executive committee of the state chamber of commerce endorsing past effort and urging its continuation.—*Eustis* (Fla.) *Region.*

Report Growth of "Buy Georgia Materials" Movement

THE Goliath of Depression is reeling under the well-aimed slingshots of Georgia Davids who are picking their stones from state mines and quarries, to use the expression of road builders and construction men meeting at Atlanta recently.

Despite close competition from out-of-state concerns, Georgia building materials were said to be growing more and more in demand in connection with road building and other construction projects.

As a result of the increased use of Georgia products a number of state mines, quarries, sand pits and concrete mixing plants, builders said, were running on full time and providing jobs for a large number of men.

It was the opinion of local builders that the continued growth of the "Buy Georgia Materials" movement will go far towards restoring prosperity in many sections of the state.—*Moultrie* (Ga.) *Observer.*

Wisconsin City Enters Gravel Business

THE CITY COUNCIL has put Portage, Wis., in the gravel business through action at a special session when it contracted with the Quinn Construction Co. to wash and crush 4000 yd. of gravel and 1000 yd. of sand from the city's pit.

The pit, from which the company has taken all the gravel for use in paving seven miles of highway north of here, still has a large supply of gravel which, if crushed and washed, will be cheaper for use than imported material.—*Madison* (Wis.) *Journal.*

High Calcium Limestone in Northern Illinois

TWO DEPOSITS of high calcium limestone occurring near Morris, Ill., are noted and described by J. E. Lamar and H. B. Willman in a bulletin just published by the State Geological Survey, M. M. Leighton, chief, Urbana, Ill.

These deposits are in Grundy county adjacent to the Illinois waterway and the Elgin, Joliet and Eastern railroad and are located less than 60 mi. by rail from Chicago.

One sample analyzed as follows:

Silica	0.94
Calcium carbonate	95.88
Magnesium carbonate	1.90
Iron and aluminum oxides	1.14

This limestone is a part of the Richmond formation of the Cincinnatian series and has the following characteristics:

Specific gravity	2.68
Water absorption	0.59%
Hardness	8.7
Toughness	4.0

The stone is rather soft and may not be suitable for road construction or as concrete aggregate, but should be suitable for use as flux or in the manufacture of cement, lime, agricultural limestone, etc.

Complete information covering these deposits is not available and they should be core drilled and tested before being worked, the report states.

One tract north of the Illinois river contains 280 acres and the other south of the river contains 1700 acres, aggregating some 85 to 110 million tons of rock.

The average thickness of the deposits is 21 in. with less than 10 ft. overburden.

Colorado Governor Insists on Colorado Materials in Road Work

INSISTENCE of Governor Adams that Colorado labor and materials be used in all highway building work has resulted in holding up a contract for four miles of paving near Lamar.

The governor has refused to approve the contract being awarded to the low bidder because it is planned to import cement from outside the state. Efforts to reach an understanding with the contractor have not been satisfactory and it is possible new bids will be asked.

Colorado cement companies have agreed to furnish the material at the same price it can be bought in other states.

The governor has pointed out a large sum of Colorado 1931 federal aid money was obtained as a means of furnishing employment in this state.

He believes it necessary for Colorado materials to be used in the highway building if the money is to be most effective. He has told all contractors it is the policy of state officials that they use the Colorado products as a means of keeping workmen busy.—*Denver* (Colo.) *News.*

Screw Feeders for Handling Rock Products

By R. F. Bergmann
Chief Engineer, H. W. Caldwell & Son Co., Chicago, Ill.

FEEDERS of the screw conveyor type have been successfully used for handling a wide variety of materials in the rock products and chemical industries and have an important place in numerous operations. While they cannot be completely standardized, there are certain fundamental features of design applying to all installations. In what follows the details of various typical successful installations are shown and also the method of arriving at approximate capacities.

Advantages of Screw Feeders

Compared with small apron and belt feeders, rotary vane feeders and drag chain feeders, screw feeders have the following advantages on many installations:

1. Compactness, leakproof and dust tight construction.
2. Economy of first cost and operation when properly designed and applied.
3. Adaptability to conventional hopper, bin or tank construction.
4. The ability to pass lumps, bolts, spikes, chips or foreign material.
5. The capacity to serve both as a cutoff valve and feeder, either at a fixed or varying rate.

Obviously, feeders possessing these features merit consideration in the selection of equipment to use with bins, hoppers, vibrating screens, etc.

Materials Handled

Some of the materials handled successfully in screw feeders are given in the classifications following:

(1) Bulk cement, hydrated or quicklime, gypsum products, soda ash, salt.

(2) Sand, limestone screenings, dolomite, clay, flue dust.

(3) Coal, pulverized or screenings, including stoker sizes up to 2 in. lumps.

(4) Coke, pulverized or small lumps.

In short, fine, free flowing materials can be handled, and a large number of lumpy products which contain fines.

Screw Feeders for Lumpy Materials

The handling of lumps of considerable size and in fair percentages presents no serious problems with screw feeders of the design shown in Fig. 1. Table *A* lists the approximate capacities of such feeders, with the maximum recommended lump sizes for each of the standard feeders.

Liberal clearance between the trough and the outside diameter of the flighting is provided to permit handling lumps without crushing or wedging between the screw flights and the trough.

Fig. 1 illustrates the principal features of design for these feeders. Lumpy materials must be fed through fairly wide inlets to prevent bridging, and for this reason the flared trough is an advantage. Too great a length of screw should not be exposed to the weight of the material in the feeding hopper and dimension "*C*" in Table *A* should therefore be followed rather closely. Free flowing materials containing only a small percentage of lumps can sometimes be fed successfully through smaller openings than those tabulated.

Beyond the feed inlet, the screw should run in a tubular trough for a distance of at least several flights (see dimension "*E*," Table *A*.) This prevents flushing of the fines over or around the flights and overloading the screw, by throttling the feed at the point of entry into the conveyor.

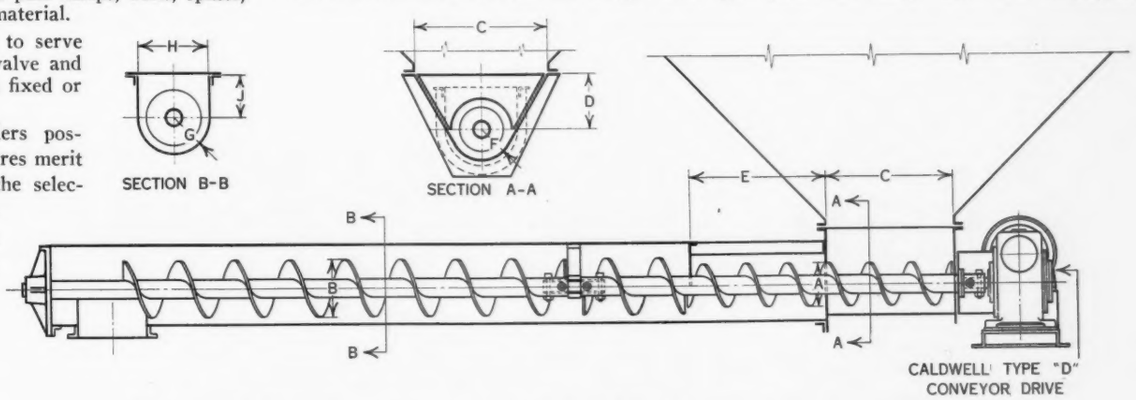


Fig. 1. This type of screw conveyor is designed for handling lumps of considerable size in fair percentages

TABLE A

SIZE OF SCREW FEEDER	MAX. SIZE OF LUMPS	DIMENSIONS IN INCHES									APPROXIMATE CAPACITY (CU. FT. PER MIN.) REVOLUTIONS PER MINUTE									
		A	B	C	D	E	F	G	H	J	10	20	30	40	50	60	70	80	90	100
6"XX HEAVY HELICOID	1"	6"	9"	18"	7⅞"	18"	4"	5½"	11"	6⅜"	.57	1.14	1.7	2.3	2.8	3.4	4.0	4.6	5.1	5.7
9"XX HEAVY HELICOID	1½"	9"	12"	24"	10"	24"	6"	7½"	15"	9¼"	1.9	3.9	5.8	7.7	9.7	11.7	13.6	15.6	17.6	19.5
12"XXX HEAVY HELICOID	2"	12"	16"	36"	15"	36"	8"	10½"	21"	13½"	4.7	9.3	14.0	18.7	23.4	28.0	32.8	37.5	42.0	47.0

MAXIMUM SIZE OF LUMPS NOT TO EXCEED 50% OF TOTAL VOLUME
CAPACITY IN CUBIC FEET PER MINUTE = (AREA OF FEEDER SCREW - AREA OF PIPE OR SHAFT × PITCH × R.P.M. × 65%)

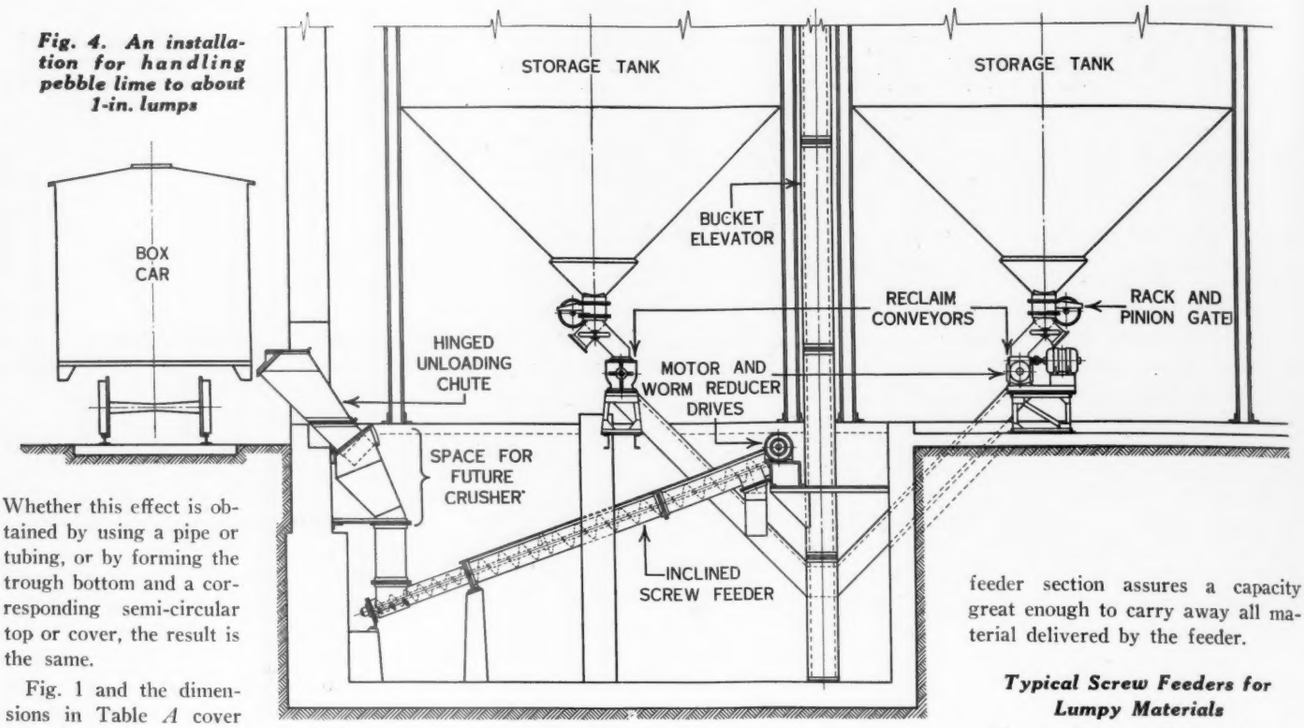


Fig. 4. An installation for handling pebble lime to about 1-in. lumps

Whether this effect is obtained by using a pipe or tubing, or by forming the trough bottom and a corresponding semi-circular top or cover, the result is the same.

Fig. 1 and the dimensions in Table *A* cover important details in the design of feeders whose length requires the use of intermediate hanger bearings for the screw. Often a screw conveyor may serve as its own feeder, or a feeder may be of such length that a single span of the screw between end bearings is impractical and cannot be used.

It is not as a rule desirable to run screw feeders in tubular housings or pipes for any greater length than necessary to prevent flushing or flooding. The solid "slug" of material traveling forward in the pipe causes greater frictional loss than when carried in a U-trough.

The capacities in Table *A* were computed by considering the material as a cylinder traveling forward at the rate determined by the pitch of the screw, with a slip or efficiency loss of 35%. The net area of the feeder screw at Section *"A-A,"* Fig. 1, was taken, deducting the area of the pipe or shaft. For nearly all materials this loss or slip has been found to be approximately the same. At low speeds the slip is somewhat greater, and on inclined feeders it may run as high as 50%.

This method of computing feeder capacities applies only to screws which are conveying from under bins or hoppers, where the screw is working under a head of material with the flighting completely submerged. The capacities listed in Table *A* should not be confused with those given in capacity charts in manufacturers' catalogs, as those apply to normal operation with the material 35 to 50% full in an ordinary U-trough, and with hangers in the conveyor line.

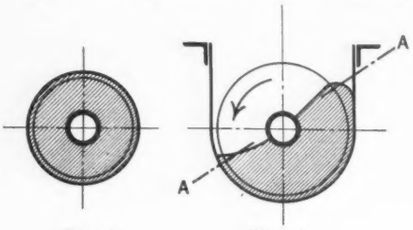


Fig. 2 ***Fig. 3***
Illustrating flow of material

Figs. 2 and 3 show graphically the difference between the conveying or loading of the feeder section and of the ordinary conveyor. Fig. 2 represents the smaller feeder section which is completely submerged in material, while Fig. 3 shows a cross section similar to *"B-B"* in Fig. 1, representing the U-trough section of the conveyor beyond the feeder portion. The material lies in the U-trough approximately as shown by the line *"A-A,"* Fig. 3.

Referring to Fig. 1 and Table *A*, the capacity of the screw feeder at Section *"A-A"* as listed in the table should not be in excess of 40% of the capacity of the enlarged Section *"B-B,"* which serves as a typical U-trough conveyor with hanger bearings supporting the screw. That is, using the same capacity formula for the feeder at *A-A* and the conveyor at *B-B*, the latter should have a theoretical capacity about 2½ times that of the feeder section. This assures a loading of not more than 40% at the hanger points, and relieves the strain on the flighting and drive machinery by preventing serious jamming or surging of the material at the hangers.

Even where hangers may not be required, it is often advisable to use a larger section of U-trough beyond the feeder portion. This will prevent compressing or jamming of the material in long, tubular housings. The use of larger diameter flighting beyond the feeder section assures a capacity great enough to carry away all material delivered by the feeder.

Typical Screw Feeders for Lumpy Materials

Fig. 4 shows an installation for the handling of pebble lime up to about 1 in. lumps, using screw feeders for charging bucket elevators from the unloading hoppers and for reclaiming the material from storage tanks.

The material is unloaded from box cars by means of an automatic power shovel (not shown in the illustration) into hoppers which spout to 9-in. diam. screw feeders in 10-in. diam. steel well casing. The 9-in. feeder section is about 4 ft. long and beyond this a 12-in. conveyor in a steel U-trough is used. The feeders are each driven by 5-hp. motors, through direct-coupled worm gear speed reducers, at a screw speed of 56 r.p.m., and have a capacity of about 20 tons per hr. These feeders not only regulate the delivery of pebble lime to the bucket elevators, but the layout with the feeders on an incline allowed room for future crushing equipment without excessive depth of pits, etc. Similar feeders are also used for reclaiming the lime from storage tanks and delivering to bucket elevators.

Screw Feeders for Fine Materials

Materials containing no lumps larger than ¼ in. to ½ in., nor any pulverized fines (200-mesh or finer), make up one group when considering the design of screw feeders. It is assumed that these products have no such high degree of fluidity as finely pulverized coal, hydrated lime, cement, etc., which require feeders and hopper construction of quite special design. These two groups are then as follows:

1. From 100-mesh to ½ in. materials, not fluid or fluffy.

2. Finely pulverized products (200-mesh or finer), similar to coal, hydrates, cement, etc., all highly fluid in action and very fluffy.

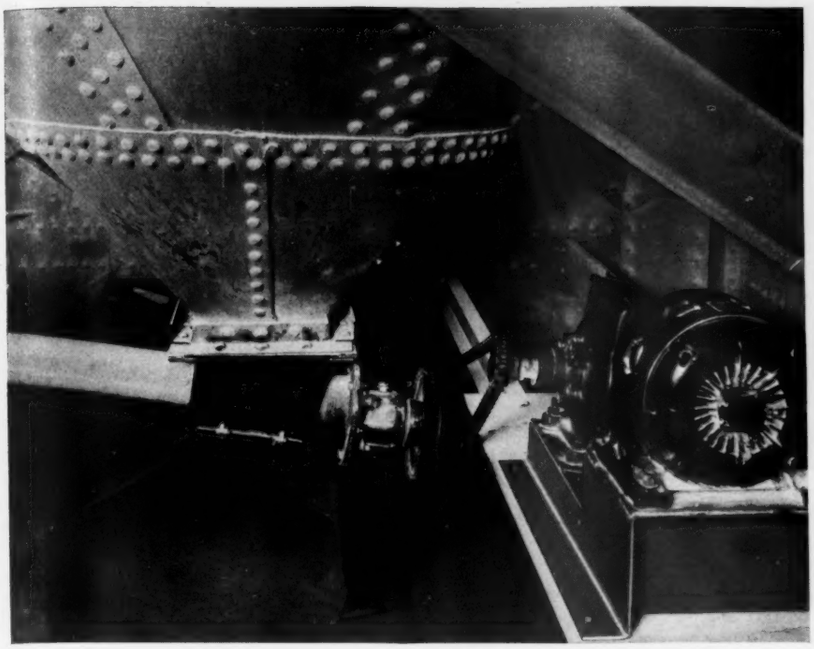


Fig. 5. An installation of an 8-in. sectional flight screw mounted in a 9-in. casing

Two installations of the first group are shown in Figs. 5 to 7 inclusive.

The inclined screw feeder shown in Fig. 5 consists of an 8-in. diam. steel sectional flight screw mounted in a 9-in. diam. steel casing. Fig. 6 is a longitudinal section of the feeder and housing, showing the inlet hopper and the application of the 2 7/16-in. diam. drive shaft to the Timken radial and thrust bearing. As in the case of screw conveyors, screw feeders develop end thrust which on direct coupled reducer drives may sometimes be taken in the transmission bearings. To overcome this, separate reducer drives with roller chain, spur or bevel gear final drives to the feeder shaft are used, and a Timken radial and thrust bearing serves the dual purpose of carrying the overhung radial load and taking the end thrust from the feeder.

The feeder shown in Figs. 5 and 6 is driven by a 5-hp. motor through a worm gear speed reducer and a roller chain drive, both the reducer and chain drive being inclined about 9 deg. from the horizontal. At a speed of 23 r.p.m. the feeder delivers 5¼ tons per hr. of quicklime (½ in. lumps and under) weighing 56 lb. per cu. ft.

The feeder in Fig. 7 is a 6-in. diam. extra heavy helicoid screw mounted on a 2⅜-in. solid shaft. The screw operates in a 7-in. diam. wrought steel well casing, with the feed inlet a special welded steel flared trough section. A one-piece inlet hopper and feeder housing is thus formed, making a very strong, dust tight and economical job.

The feeder is driven by a 3-hp. motor through a worm reducer and roller chain drive, at a speed of 36 r.p.m., and delivers 3½ tons per hr. of ground quicklime (50- to 100-mesh) weighing 55 to 60 lb. per cu. ft.

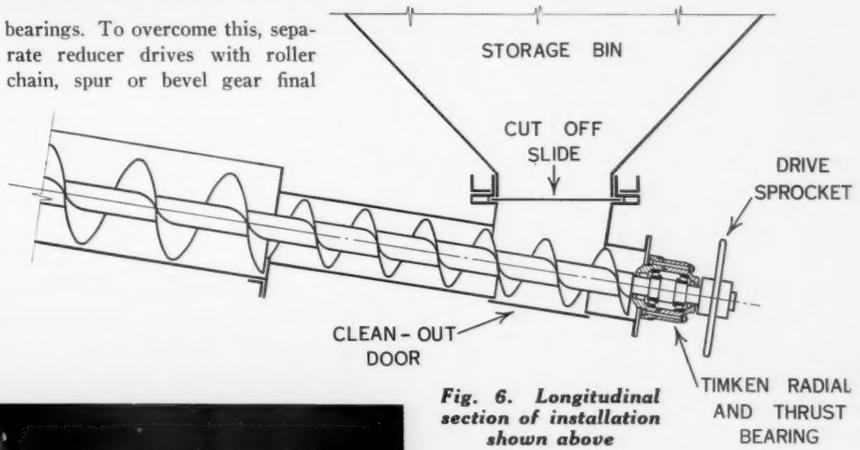


Fig. 6. Longitudinal section of installation shown above

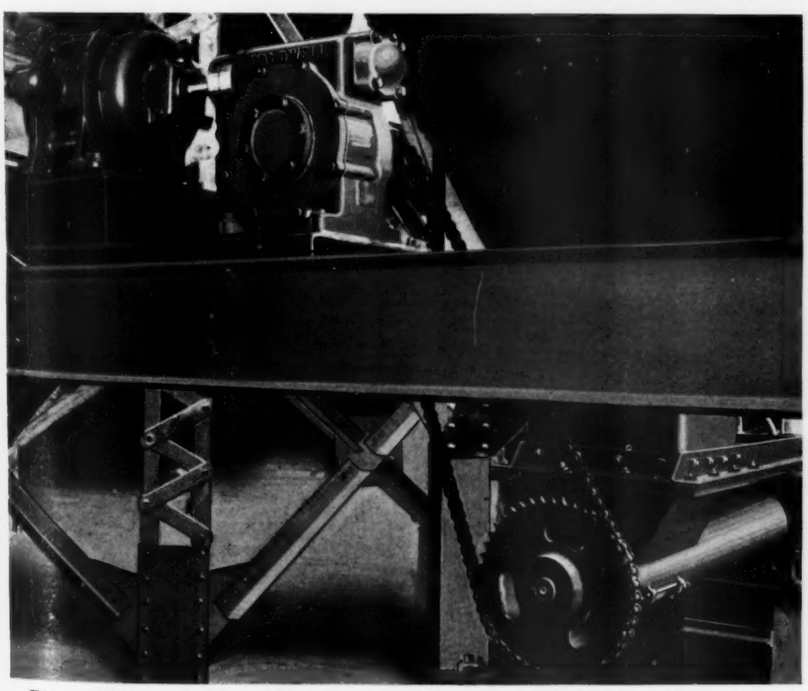


Fig. 7. This and the feeder above suitable for materials from 100-mesh to 1/2-in. not fluid or fluffy

Screw Feeders for Pulverized Materials

In handling pulverized materials, or the second group mentioned above, the problem of preventing flooding becomes more serious, as the fluidity or fluffiness of the product is greater. Such materials are also more difficult to feed to the screw, requiring hoppers of special construction to prevent bridging or arching, or the forming of air pockets in the bin bottoms.

Figs. 8 and 9 show a typical screw feeder for handling bulk cement from storage bin to batcher in a central mixing plant. Depending upon the size of plant and batches required, these feeders are from 9-in. to 16-in. in diameter, and are designed to charge the weighing batcher within a certain number of seconds as the cycle of operations demands. The screws are operated intermittently by individual motor and reducer drives, and serve both as a cutoff valve and feeder.

Manufacturers of batching equipment have

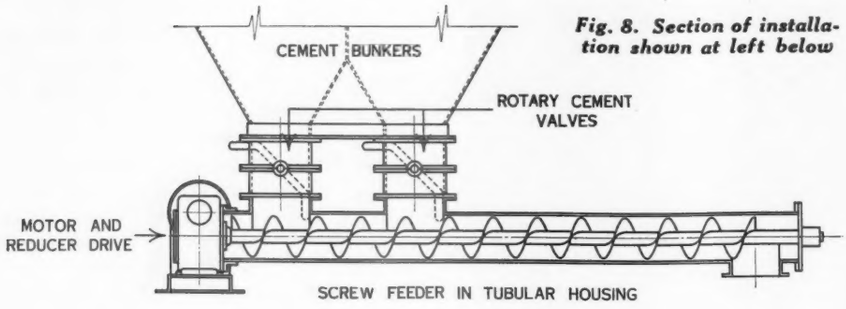


Fig. 8. Section of installation shown at left below

recently developed automatic weigh batchers for bulk cement, incorporating several arrangements of screw feeders with unit motor drives and automatic electrical controls. One of these is shown in Fig. 10. The screw is a 12-in. diam. double flight helicoid, turned to 11¾-in. diam. and mounted in a 12-in. diam. pipe, the double flighting being used to prevent flooding or flushing of the cement

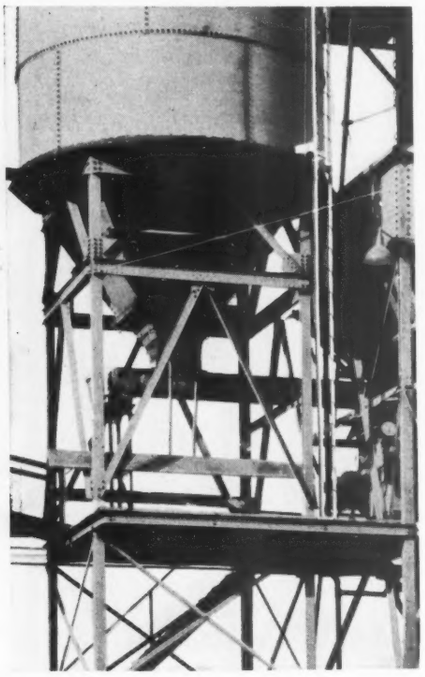


Fig. 9. Conveyor handling bulk cement from storage bin to batcher

around the screw, and to reduce the spill or dribble after the motor controls cut off. The feeder is inclined in order to save head room and to further prevent flooding through the screw and housing. When a batch is to be weighed, the operator starts the motor by means of a push button, and as the scale beam tips at the predetermined weight a control on the beam opens the circuit and stops the rotation of the feeder.

Another manufacturer has recently developed an automatic bulk cement batcher, which makes use of a double screw feeder consisting of one large and one small conveyor, with a common inlet or feed hopper, but with individual tubular housings or troughs beyond the feed point. The two screws are driven by separate motors and worm reducers, and are inclined about 12 to 15 deg. from the horizontal.

For about 90% of the batch, both feeders operate and deliver material to the weighing hopper. At approximately nine-tenths of the predetermined weight, the larger feeder is stopped by a mercury switch on the scale beam, and the smaller auxiliary screw mounted alongside the main feeder continues to rotate, feeding in the "dribble stream" or final flow. As the smaller screw feeds the exact amount of cement, a second mercury control switch on the scale beam cuts out the motor drive automatically.

Dry pulverized materials often absorb moisture and pack in hopper bottoms, or they become "air bound" and bridge readily so that compressed air is sometimes used to break down the material at the bottom of the hopper. Vibrators and mechanical agitators are also used for this purpose. Steep hopper sides are essential to the successful feeding of many products.

Figs. 11 and 12 show an interesting screw feeder used for handling pulverized coal and also the raw mix to cement kilns.

In this case the sides of the hoppers have a slope of about 60 to 70 deg. from the horizontal and the bottom of the feed hopper is divided into two sections as shown.

Under each compartment a double flight screw conveys the material as shown by the arrows to a central outlet above which is provided an overflow compartment.

The purpose of this overflow compartment is to provide a means of deaerating the pulverized coal and bringing it to a condition of uniform density. At the bottom of this compartment the material is continually being agitated by the supply brought in from both sides by the two feed screws, thus causing the material to be fluffed up into the overflow compartment, where the entrained air is released and allowed to escape through vent pipes extending up the sides of the bin.

In other words, the material introduced by the two feed screws contains a certain amount of entrapped air, and being lighter than the deaerated material in the bottom of the feeding box, it is pushed up into the overflow compartment, where it is deaerated and gradually works its way down because of its greater density.

In this way a uniform and continual supply of deaerated material is coming into the

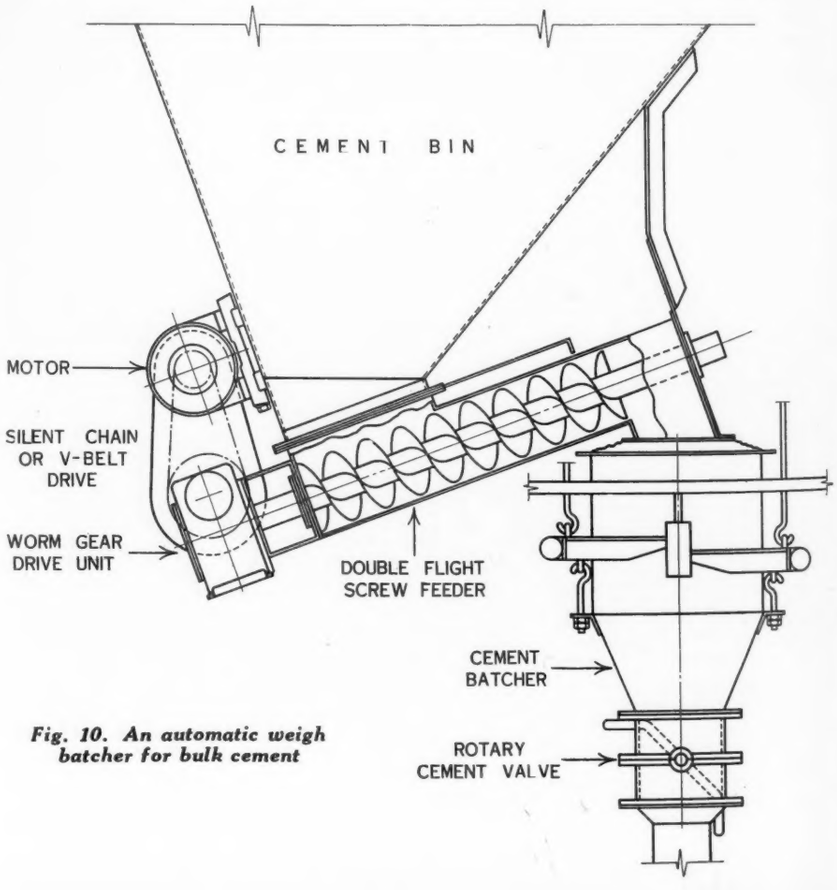


Fig. 10. An automatic weigh batcher for bulk cement

bottom of the feeding box, from which it is fed by a second double flight screw to the discharge box. The screws are geared together as shown, the final unit running at a speed somewhat higher than the two feed screws. This prevents any possibility of packing or jamming in the overflow compartment.

Portable Screw Feeders

The compactness and self-contained design features of screw feeders, troughs and inlet

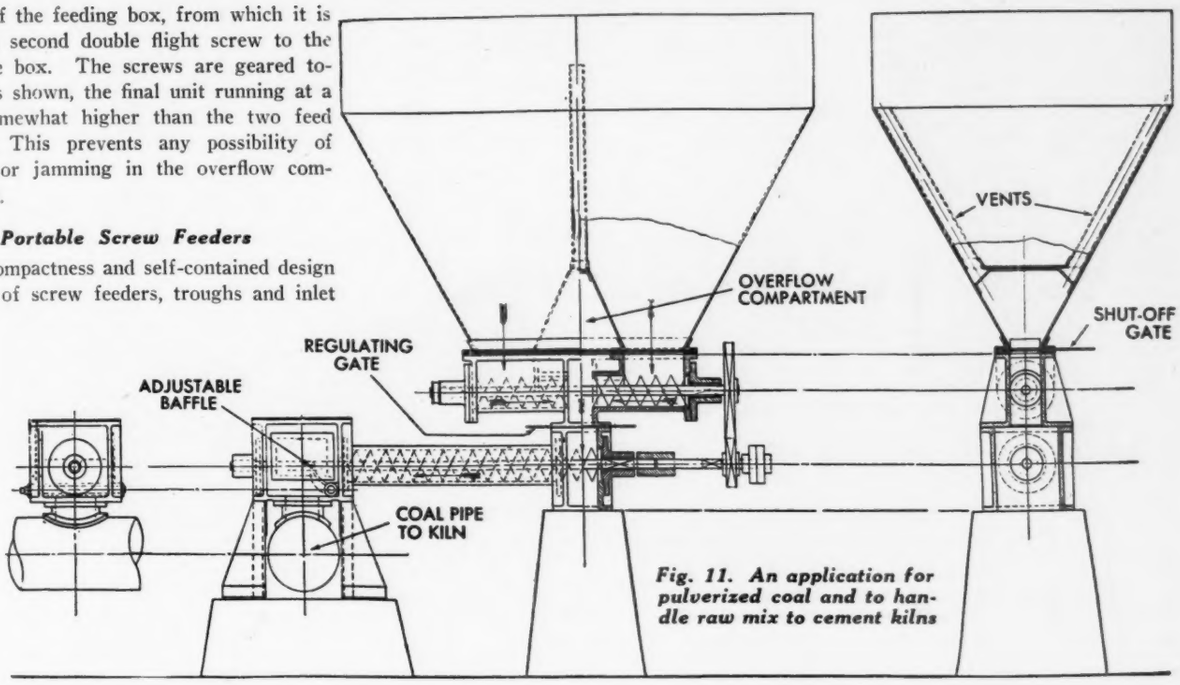


Fig. 11. An application for pulverized coal and to handle raw mix to cement kilns

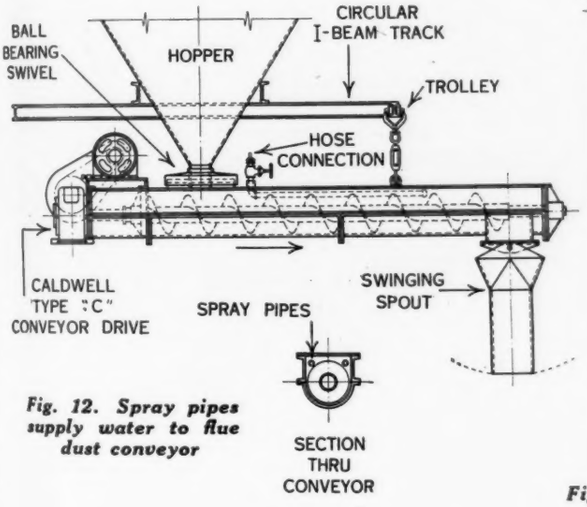


Fig. 12. Spray pipes supply water to flue dust conveyor

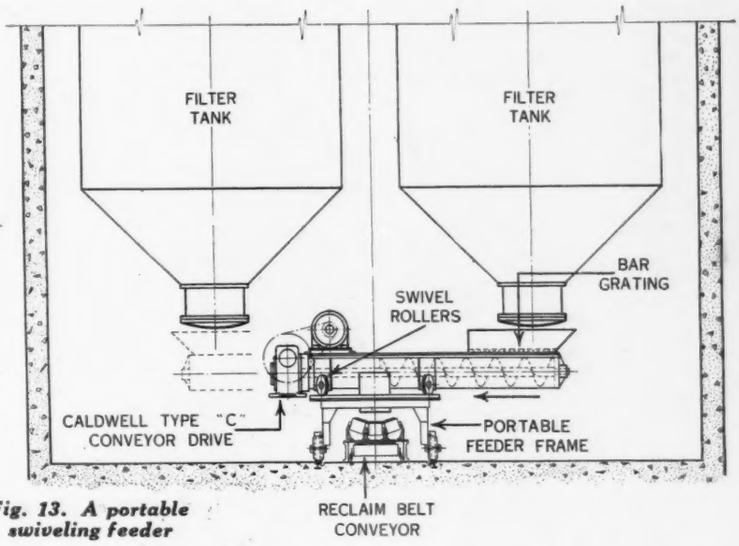
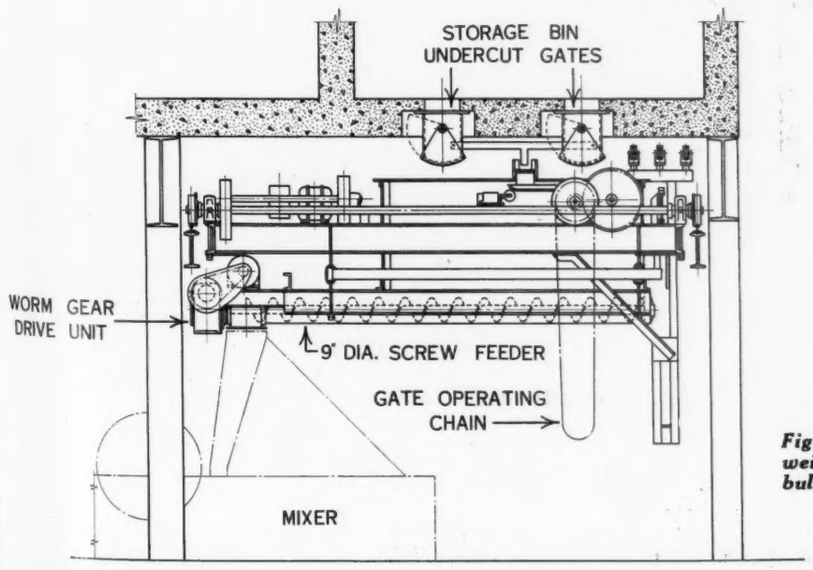


Fig. 13. A portable swiveling feeder



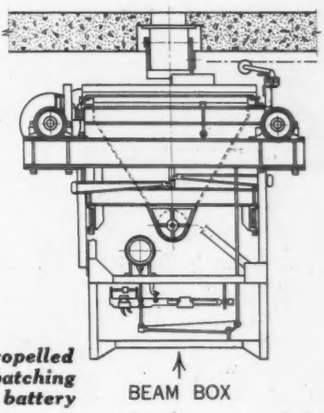


Fig. 14. Motor propelled weigh larry for batching bulk cement to a battery of mixers

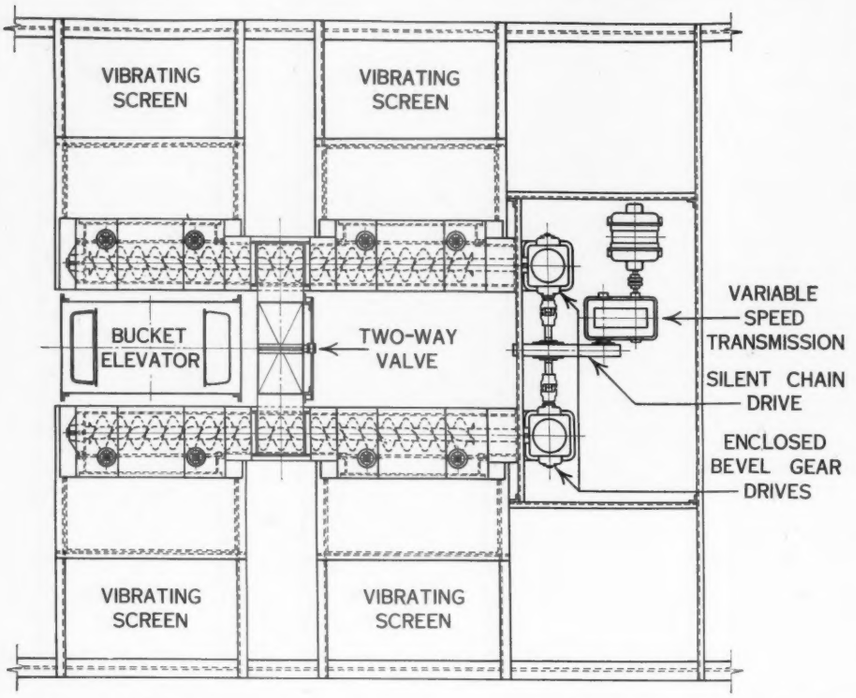


Fig. 15. Variable speed screw feeders to distribute materials over four vibrating screens

hoppers naturally afford many opportunities to apply them as cleverly developed portable units. They may be arranged to swivel about the inlet hopper or discharge spout almost at will, conveniently mounted on hand or motor propelled trucks or suspended from overhead trolleys.

Fig. 12 shows a portable feeder supported at the inlet hopper on a ball bearing swivel and hung from a trolley on a circular I-beam track at the opposite end. This feeder handles flue dust and is arranged with a hose connection so that it may be sprayed with water to reduce the dust. The unit may be swung to discharge over the length of a gondola car which runs under the hopper.

The feeder consists of a 12-in. diam. steel screw mounted in a cast iron trough with steel channel sides and provided with a silent chain and worm gear drive.

The portable swiveling feeder shown in Fig. 13 handles material somewhat like ground lime or sand from storage tanks to a reclaiming belt conveyor, at the rate of about 15 tons per hr. It consists of a 12-in. diam. steel screw conveyor in a 3/16-in. steel trough with a self-sealing hopper and bar grating at the inlet, and a 3/16-in. welded steel discharge spout with flanged seal ring.

The feeder is mounted on a structural steel frame which is fitted with wheels and carries a cross-over platform and steps, and a circular track for the feeder. It is hand propelled and the feeder is driven at a speed of 80 r.p.m. by a 3-hp., 1160 r.p.m. motor through a silent chain and worm gear drive unit.

Portable feeders have also been used very advantageously to eliminate large numbers of individual rotary feeders, with their transmissions and clutches below storage bins in the handling of various materials to reclaiming conveyors. For example, in one instance the material is discharged from the bunkers through rack and pinion gates into a portable feeder hopper on rails over a distributing screw conveyor. The hopper is arranged so that it is self-sealing at the gates and delivers a uniform amount of material to the distributing conveyor. With this arrangement it is possible to load the distributing conveyor at any number of points under a long bunker.

In another case a number of portable feeder screws have been used for charging furnaces, being carried on motor propelled larries and arranged with an inlet hopper and a frame for supporting a large charging hopper. The charging hopper is set in the larry by an overhead crane, a gate is opened and the material is let down into the hopper and feeder.

The feeder is a 12-in. diam. steel helicoid screw in a ¼-in. steel trough, with a 3/16-in. steel water jacket at the discharge end.

They are driven at speeds of 1.2 to 25 r.p.m. by a specially arranged drive consisting of worm gear speed reducers and change gears.

Another interesting motor propelled weigh larry used for batching bulk cement to a battery of mixers is shown in Fig. 14. In this case bulk cement from a concrete bin overhead is drawn into a weighing hopper by means of a gate operating mechanism carried on the larry. The weighing hopper is mounted on scales equipped with a registering beam and a telltale dial and has a capacity of about 2000 lb. After the hopper is filled the larry is propelled electrically by a push button control and is spotted at the proper position over one of the mixers. Then by means of a separate push button control for the motor driving the screw the operator feeds the proper amount of cement to the mixer.

Variable Speed Feeders

In mixing and batching bulk ingredients, screw feeders with variable speed drives are widely used. Once adjusted to a certain rate, a screw feeder will deliver material very uniformly if the bin and inlet hopper are properly designed to prevent bridging, air pockets or flooding.

Variable speed transmissions are now made which may be used in connection with speed reducers or chain drive reductions on screw feeders for accurately controlling and varying the rate at which the material is fed.

An arrangement of variable speed screw feeders to distribute clay, shale and sandstone over a battery of four vibrating screens is shown in Fig. 15. Here adjustable wier gates are also used for spreading the discharge of material over the full width of the vibrating screen.

The material from the grinder or dry pan is discharged by the elevator into a large two-way spout over the two screw feeders, each of which serves a pair of vibrating screens. Each feeder consists of a 12-in. diam. heavy double flight helicoid screw, divided right and left hand from a point located centrally under the feed inlet. As the clay, shale and sandstone is discharged by the elevator the adjustable two-way valve in the spout divides the material between the two feeders. Or, when operating at 50% of capacity, all material may be passed to one feeder and bank of screens.

The screws rotate so that the material is carried on the side of the trough which is toward the screens and an adjustable wier gate is provided on that side of the trough, so that the discharge is spread over the full width of the screen by setting the gate or baffle at the proper inclination along the screw flighting. For materials like clay and shale especially, which may at times contain considerable moisture, uniform distribution over the screening surface is essential. This arrangement not only provides effective distribution over the surface of each screen, but the total tonnage is equally divided between the screens.

The maximum rate of feed to the four screens is approximately 90 to 100 tons hourly, of which 60 to 75% is a circulating load. Due to fluctuations in this circulating tonnage, a variable speed drive is provided for the distributing feeders over the screens so that the rate of feed to the screens may be adjusted to prevent any accumulation of material between the elevator discharge and the screw feeders. Fig. 15 shows the arrangement of the variable speed drive for the two feeders.

For slow speed screw feeders there are a number of ratchet or change gear variable speed drive units which may be applied as shown in the typical installation in Fig. 16. These transmissions have a speed range which may be somewhat limited for some conditions, but by using a standard variable speed motor with such a drive unit a total variation in rate of feed is accomplished which serves very nicely for many purposes.

Fig. 16 is of further interest in that it shows three separate and distinct operations performed by screw or paddle feeders in a very compact arrangement of equipment for the preparation of a dolomitic refractory for open hearth steel furnaces. Limestone (⅜-in. to ¾-in. screenings) is fed from a storage tank at the rate of 5 tons per hour by a slow speed, heavy 12-in. diam. steel screw in a tubular steel housing, to a 20-in. diam. cast steel paddle or pug mill which is mounted on the same driving shaft as the feeder screw. The pug mill has a heavy steel U-trough with a discharge spout to the rotary burning kiln. A spray pipe with regulating valve is fitted in the top of the trough.

Flue dust is introduced at the receiving end of the pug mill by means of a second screw feeder from the flue dust storage bin, at an adjustable rate (approximating 1000 lb. per hr. for normal operation). The limestone and flue dust are thoroughly mixed with the proper amount of water in the pug mill, and fed at a uniform rate to the rotary kiln.

The screw feeder for flue dust is of 6-in. diam. at the inlet, mounted in a tubular steel housing with a flared hopper connection to the storage bin. Beyond the feeder portion, the screw is of 9-in. diam., and is mounted in a dust tight steel U-trough. This feeder is driven by a 1-hp., 1750 r.p.m. variable speed motor coupled direct to a fully enclosed worm gear and 3-speed ratchet transmission.

Screw Feeders for Hot Materials

For hot materials or for the feeding of raw products into or from hot furnaces, water jacketed housings or troughs have been designed and heat resisting alloy cast steel screws have been successfully developed. Screw feeders have even been made with hollow pipe shafts carrying a stream of water for cooling. The simplicity and economy of screw feeders on high temperature materials, and the ease with which they may be water jacketed, naturally affords opportunities to employ them on such jobs.

Screw Feeders in the Preparation of Special Products

Producers of rock products in search of new markets may encounter many new sales possibilities for special or newly developed products consisting mainly of mixtures or fixed proportions of well known, basic elements. In the continuous production, batching or proportioning of such specialties, screw feeders may often be applied at a minimum investment and operating cost. The capacity table, design suggestions and descriptions of typical installations are intended to assist plant engineers or operators in the selection of proper and economical equipment for such problems as well as for general conveying or material handling installations.

State Provides Rock Crushers for Farmers

BY COOPERATING with the Tennessee State Department of Agriculture farmers can get crushed lime at a cost of about 60c. per ton. The state has a number of crushers that are available when 25 farmers from the county have signed up a set of rules. The farmers furnish the rock and the state furnishes the machinery.

Where there is any question as to the richness of the rock, samples may be sent to the state chemist for analysis, which service is free.—*Lawrenceburg* (Tenn.) *News.*

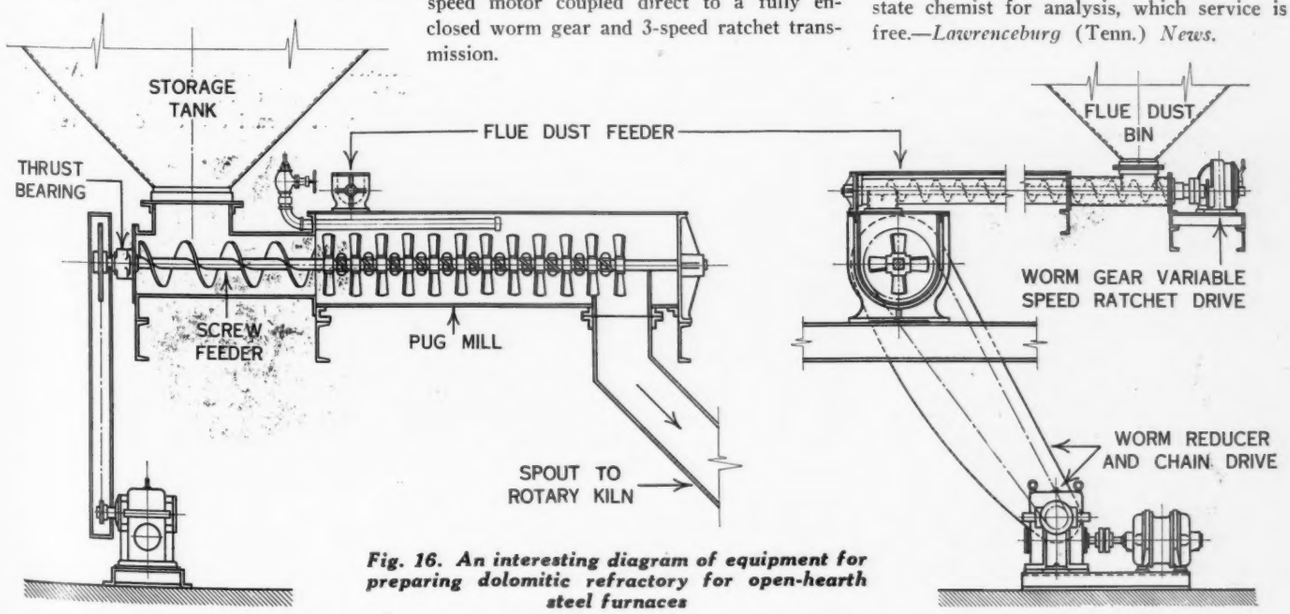


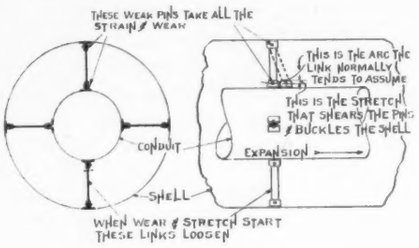
Fig. 16. An interesting diagram of equipment for preparing dolomitic refractory for open-hearth steel furnaces

New Machinery and Equipment

Dryer Suspension

A NEW METHOD of suspension of the central conduits of double-shell dryers is announced by the Louisville Drying Machinery Co., Inc., Louisville, Ky.

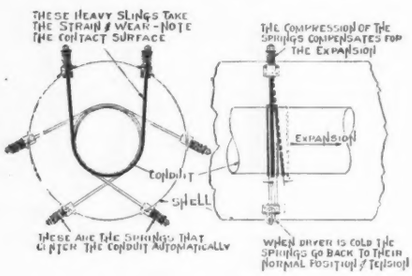
This suspension system is said to be



Standard strut construction

adaptable to any make of double-shell dryer, old or new. The manufacturer also states that it can be installed by the maintenance crew of any plant.

The details of construction of this equip-



Spring-suspended construction

ment are shown in accompanying illustrations.

The features claimed for this method of suspension are that it is automatically self-aligning through spring-suspended U-bolts and that it is easily adjusted at any time. This spring suspension is said to permit expansion and contraction of the inner conduit without setting up destructive stresses in the conduit, thereby reducing or eliminating one of the causes of shut-downs.

Completed installation

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Endless Rubber Belt

A NEW endless belt, "Flexicord," is announced by the Cincinnati Rubber Manufacturing Co., Cincinnati, Ohio.

According to the manufacturer, this belt was developed especially for the hardest drives and stands up well under heavy loads suddenly applied, and many quick starts and stops.

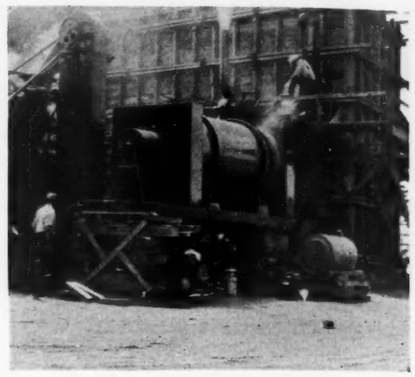
Special features claimed for the belt are that each is built to exact size without a joint or splice, that the straight-laid, lengthwise, auto tire cords used resist stretching and add additional strength, and that the tough rubber cover adheres closely to the pulley, will not slip and develops maximum horsepower.

•

Portable Asphalt Plant

ACCOMPANYING illustrations show a pre-mixing portable asphalt plant manufactured by the Chausse Oil Burner Co., Elkhart, Ind. It consists of two units, both mounted on wheels. In the illustrations the units have been cribbed up because of ground water level.

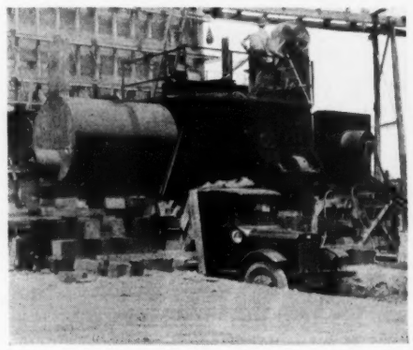
In this asphalt plant aggregate from the gravel plant feeds to a rotating sand drier. It is dried and heated at 300 deg. F. and elevated to a continuous blade type pug mixer. Here heated asphalt from a 950-gal. tank is added in amounts up to 10%, as predetermined. From the pug mill the hot mixture



Rotating drum dries and heats aggregate

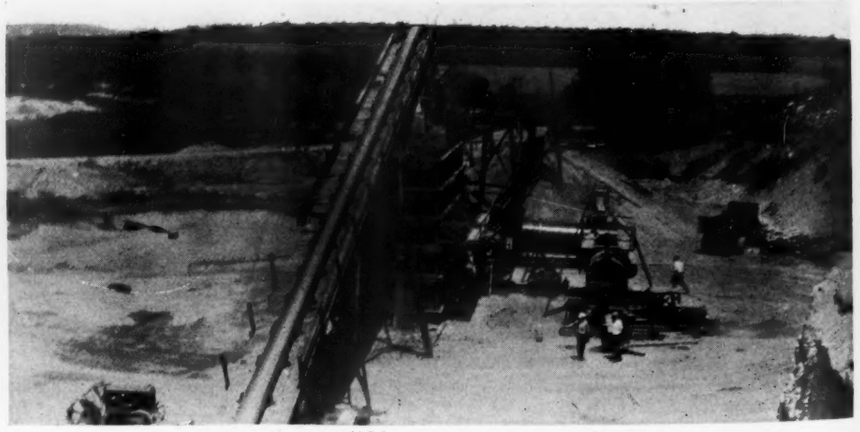
is dropped into a storage bin from which trucks load.

The manufacturer states the plant can be used for all standard asphalt mixes using



Truck loading from storage bin

crushed rock, sand and gravel, and either hot or cold laying. It is equipped with two Hercules engines, oil burners, an American exhaust blower and small Worthington compressor. It is said about a day is required



Plant installed for operation in gravel pit

to move and reset the equipment, so that operators having several pits may find one plant sufficient for their requirements.

•

Nickel Manganese Steel Welding Rod

A NEW nickel manganese steel welding rod has been announced by the American Manganese Steel Co., Chicago Heights, Ill.

Features claimed by the manufacturer for this welding rod are (1) that welds can be made by relatively unskilled operators; (2) when the rod is melted in the atmosphere and applied to ferrous metal articles, it exhibits the essential characteristics of standard heat treated manganese steel, namely toughness, ductility, resistance to abrasion and hardening under cold working; and (3) the high nickel content (approximately 5%) overcomes any tendency of the metallic manganese content of the rod to oxidize and prevents embrittlement under slow cooling, which the rather high carbon content might cause in the absence of the high nickel content.

The Amsco manganese steel rod is said to be suitable for use in the repair of manganese steel castings and the reclamation of such manganese steel equipment as dipper teeth, crusher mantles and jaws, railway track members, etc. It can also be used for these purposes on parts of ordinary steel and also for a wear resistant coating on most steel castings.

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Welding Fittings

A NUMBER of "Midwest" welding fittings are announced by the Midwest Piping and Supply Co., Inc., St. Louis, Mo. These fittings consist of 90- and 45-deg. ells, heads, saddles and sleeves.

The ells are claimed to be of exact radius and sectional diameter and in perfect round, and to have tangents of ¼ in. for each inch of pipe diameter. The ellipsoidal form of the welding head is said to reduce the unit stress in the metal to a minimum. The welding sleeve has a transverse recess which the manufacturer states permits application of the sleeve over the conventional line weld. The design of the saddle plate has proved, through recent tests, it is said, to give appreciably increased strength where used.

Saddle plate reinforces joint

Vibrating Screen for Bucket Loader

A NEW three-product vibrating screen for use with its model 62 heavy duty self-feeding bucket loader has just been introduced by the Barber-Greene Co., Aurora, Ill. This screen and loader combination may be found useful by producers of commercial aggregates for rescreening, stockpiles, etc.

The new screen is made up of two screen cloths vibrated by an alloy steel eccentric shaft driven by a power takeoff direct from the main transmission of the loader.

The entire screen frame is vibrated in the center and cushioned on each end, and is counterbalanced so that no vibration is carried back to the loader frame, the manufacturer states.

Material discharged from the buckets of the loader falls first on a large mesh screen

Useful for rescreening

cloth which removes oversize, carrying it off over a steel chute. Shaken through the first screen, the material drops on a finer mesh below. The finest size falls through this cloth on to a rubber belt conveyor which carries it out and discharges it at a point 9 ft. from the center of the machine, while that which remains on the second screen passes off over a chute directly in back of the loader.

Either loader or screen may be operated independent of the other, it is said.

•

Light Drill Sharpening Machine

THE Sullivan Machinery Co., Chicago, Ill., announces the introduction of the Sullivan class "E" sharpener, designed to bring the advantages of mechanical sharpening and shanking of rock drill and hammer drill steel to the assistance of those mines, contractors and quarrymen, who have hitherto depended on hand blacksmithing, due to the small amount of work which they have had to do of this character.

The new sharpener is said to make cross

For those with few drills

or rose (6-point) bits to 2½-in. maximum gage on ⅞-in. or 1-in. steels and forges collar shanks for any section.

This sharpener weighs 350 lb. and occupies a floor area of 18 in. square. It stands just over 4 ft. in overall height and operates without other foundation than that provided by bolting it to the floor or to light timbers, the manufacturer states.

•

Paper Bag

THE Universal Paper Bag Co., New Hope, Penn., announces it has recently equipped its plant with modern and up-to-date bag making machinery. This new plant is now manufacturing kraft multi-wall paper bags for the cement and pulverized rock products industries.

The Universal Paper Bag Co. also announces the appointment of E. T. Statler to the multi-wall paper bag sales division. Mr. Statler has been identified with the multi-wall paper bag industry ever since its inception.

•

Gets Large Order for Locomotive Bearings

AN ORDER has been received by the Timken Roller Bearing Co., Canton, Ohio, for the bearings for 150 of the new electric locomotives to be built for the Pennsylvania railroad for its electrification project between New York and Washington.

The order includes tapered roller bearings for all of the engine trucks and the driver wheels. Of these locomotives, 90 are for passenger service and 60 for freight service. The passenger locomotives are designed for a speed of 90 mi. per hr.

The equipping of these locomotives with Timken bearings is the result of long experiments involving a great deal of preliminary research work, and the development of a particular type of Timken bearing and mounting especially suited to this work, it is said.

Recent Prices Bid and Contracts Awarded

Provo, Utah. Urban E. Overlade was granted a contract for furnishing gravel for oil mulch surface by county commissioners here. His bid for the gravel spread on the road was $1.12½ per cu. yd. on 600 cu. yd. of gravel.

Wheeling, W. Va. Payment to Ellsworth Malloy was ordered in a requisition for 60 cu. yd. of napped limestone at $3 a cu. yd., the standard rate here.

Portsmouth, Ohio. Portsmouth Cement and Lime Co. was awarded contract by the city for 500 bbl. of portland cement on its low bid of $1.55 per bbl. Horr Bros. were awarded contract for 200 bbl. of quick hardening cement at $2.16 per bbl. Contract for 600 cu. yd. of sand and 400 cu. yd. of gravel was awarded the Portsmouth Sand and Gravel Co. on its bid of $1.25 per cu. yd.

Pueblo, Colo. Driscoll Construction Co. recently was awarded a contract to supply 800 cu. yd. of gravel surfacing material on the unit bid of 60c. a cu. yd.

Indianapolis, Ind. Charles H. Mann, county highway superintendent, announces he has purchased gravel for county maintenance at 40c. a cu. yd., whereas the former price was nearly 90c. Approximately 3000 yd. have been purchased.

Medina, Ohio. Bids recently opened for supplying crushed stone for county roads averaged $1.49½ a cu. yd., and 36,720 cu. yd. of material were purchased.

Los Angeles, Calif. Five bids in southern California recently made on cement requirements of Los Angeles county for flood control projects were $2.40 per bbl. each. County officials said that price was somewhat higher than the county paid recently for cement.

Crestline, Ohio. The low bid for supplying 150 tons of sand and stone was submitted by the Crestline Equity at $1.70 per cu. yd. The low bid on 150 bbl. of cement was submitted by Weaver Bros. Co. at $1.85 per bbl.

Houston, Tex. Announcement has been made that the Lone Star Cement Co. of Dallas, Tex., has been awarded a contract for the delivery of 50,000 bbl. of cement to Cristobal, Panama, Canal Zone, at a contract price of $102,500, less 10c. per bbl. discount for payment within 15 days after loading at a Texas port. The Florida Portland Cement Co. was low bidder, but the 10c. discount offered by the Dallas company brought its offer lower.

Inspection Procedure

A BULLETIN published by the National Engineering Inspection Association, Pittsburgh, Penn., gives tentative methods of procedure for the inspection of various materials.

The booklet gives inspection methods for cement, concrete, timber poles and ties, steel and cast iron pipe, rails and structural steel.

F. D. Hooper Appointed Sales Manager

THE Barber-Greene Co., of Aurora, Ill., announces the appointment of F. D. Hooper as general sales manager. Mr. Hooper was formerly sales manager of the Lidgerwood Manufacturing Co., of Elizabeth, N. J.

Mr. Hooper was born and raised on the "sidewalks of New York." He received his mechanical engineering and electrical engineering degrees at Sibley College, Cornell University, graduating in the class of 1907. He was employed by the Lackawanna Steel Co. (now Bethlehem Steel) and the Boston and Maine railroad before starting his 24 years of continuous service with the Lidgerwood company.

F. D. Hooper

New School Teaches Welded Building Design

THE General Electric Co., Schenectady, N. Y., has announced the opening at Schenectady of a school of welding design to teach engineers, architects, draftsmen, etc., both in and out of its employ, methods of designing welded buildings.

There is no charge for instruction in the course, which requires approximately four weeks for completion. It is a flexible one and can be adjusted to suit each individual. The course requires that the applicant be an engineer, or have some training in structural design or some experience in the design of riveted structures. It is then only necessary for him to learn the difference between the application of welding and riveting to steel frames.

The subject is approached from a scientific point of view based on studies and tests by the General Electric Co. over a period of years in welding work, particularly in the construction of its own factory buildings.

Treatise on Leather Belting

A NEW BOOK on leather belting by George B. Haven and George W. Swett of the Massachusetts Institute of Technology has been published by the American Leather Belting Association.

This book, which should be of interest to those using leather belts, deals with leather belting and belting practice and describes various installations.

The manufacture of belting is explained and the importance of properly matching the various pieces of which it is made in order to get a true running belt of uniform thickness and strength is discussed.

Flanged pulleys are not considered as desirable as pulleys with curved crowning, the book says. The amount of crowning should be ⅛-in. per ft. of pulley width. Belts should be made endless by lapping and cementing whenever practicable and stiff metal fasteners should not be used. Various methods of making both single and double belts endless are described in detail.

The point is made that in many cases group drives by means of belts is more desirable than individual small motor drives. This is explained by stating that the cost of a number of small motors along with speed reduction drives is several times as great as where one large motor and belt drives are used.

Standard specifications covering belting and methods of testing it are also given along with various useful tables.

Opens Second Oldest Mica Plant After Long Shut-Down

THE David T. Vance mica grinding mills at Plumtree, N. C., the first mica grinding plant in North Carolina and the second in the world, the oldest being in Richmond, Va., reopened recently after being shut down during the past four years.

The mill of the late T. B. Vance also opened. All employes of the plants are native North Carolinians.

Business was started in 1891 under the management of T. B. Vance, brother of the present owner, David T. Vance, and H. R. Jones, his brother-in-law. The partnership was dissolved in 1894 and the firm was known as Vance Bros. during the next six years.

In 1909 David T. Vance started the Tar Heel Mica Co., which is the only plant in the south making mica plate or composition mica. There are only about half a dozen such plants in the United States. The Tar Heel Mica Co. makes mica lamp shades as well as electrical installation material.

The Tar Heel Mica Co. is under the management of Iver Vance, son of David T. Vance. Two other sons, Friel and Sam, are in charge of the mills that have just reopened to grind muscovite mica.—*Asheville (N. C.) Times.*

The Rock Products Market

Wholesale Prices of Aggregates

(F.O.B. Plant or City Designated)

Prices given are for crushed limestone per ton, unless otherwise stated

	Crushed stone: Screenings, ¼ in. down	Crushed stone: ½ in. and less to 2½ in.	Sand: ¾ in. and less	Gravel, ½ in. and less to 2 in.	Slag: Screenings, ¼ in. down	Slag: Crushed, ½ in. and less to 3 in. and larger
EASTERN:						
Albany, N. Y.			.70	1.00		
Alexander, N. Y.			.65	.65		
Bethlehem, Penn.					.50– .60	.50–1.50r
Birdsboro, Penn. (trap rock)	2.10	2.20–2.50				
Boston, Mass. (g)			1.15	1.75		
Buffalo, N. Y.	1.25¶	1.25¶	1.00–1.10d	1.00–1.10d	1.50d	1.50–1.60d
Clarence, N. Y.			.60	.60		
Durham, Penn.			70– .80	.80– .90		
Erie and Du Bois, Penn.					1.50	1.50–1.60
Hillsville, Penn.	.85	1.35				
Montoursville, Penn.			1.00	.40		
New York City			1.00	1.50		
Oriskany Falls, N. Y.	.50–1.00	.80–1.10	50– .75	.50–1.10		
Philadelphia, Penn. (a) (trap rock)	3.45		1.40	1.95		2.95
Rochester, N. Y.			1.40	1.40		
Washington, D. C.			.85	1.30		
CENTRAL:						
Alton, Ill.	1.75	1.75j				
Chicago, Ill.			.85	.95		
Davenport, Iowa	1.10	1.00–1.50q				
Grand Rapids, Mich.	.60– .65p	.90–1.00p	.40– .50	.60– .70		
Hannibal, Mo.¶	1.00	1.40				
Indianapolis, Ind.			.40½–.81*	.81*		
Maplewood and St. Louis, Mo.	1.25	1.25	.80			
Merom, Ind., and Palestine, Ill.			.40– .50	.60– .75		
Milwaukee, Wis.	1.14	1.24	1.10–1.60	1.10–1.60		
Pacific, Mo.			.50	.50		
Sheboygan, Wis.	1.25	1.25				
Stone City, Iowa	.75	1.00				
St. Paul, Minn.	.70	1.25	.35	1.25		
Toledo, Ohio	1.10	1.60			1.00	1.10
Waukesha, Wis.	.90	.90	.45	.55		
SOUTHERN:						
Atlanta, Ga. (granite)	1.10	1.50				
Birmingham, Ensley and Gadsden, Ala.					.80	.90–1.25
Cartersville, Ga.		.75				
Columbia, S. C. (granite)	.40– .50	1.15–1.40				
Ensley and Alabama City, Ala.					.80	.80–1.25
Fort Springs, W. Va.	.35	1.00–1.35				
Houston, Tex.			1.25*	1.95k		
Knoxville, Tenn.	.50		.60–1.00	1.00–1.25		
Longdale, Va.					.75	1.05–1.25
Montgomery, Ala.			.25– .35	.50– .60		
Richmond, Va.			1.15	1.75	3.00	3.00
Roseland, La.			.40	.75		
Tyrone, Ky.	.50– .90	.50–1.25				
WESTERN:						
Denver, Colo.			1.25*	1.90–2.10*		
Phoenix, Ariz.			1.15	1.50		
Salt Lake City, Utah			.60n	.60n		
San Francisco, Calif. (Bay points)	1.45	1.45	1.45	1.45		
Seattle, Wash.			1.25*	1.25*	1.25*	1.25*
Tulsa, Okla.	.70	1.20				

*Prices per cu. yd. ¶F.o.b. cars. †Less 10c per ton monthly settlements disc. ‡Prices less 5c disc. per ton for payment 15th following month. (a) Consumer prices subject to cash disc. of 10c per ton. (b) ½ in. to 1½ in. (c) 1½ in. and less. (d) F.o.b. trucks at plant. (e) Delivered in truck loads. (f) ¾ in. to 2½ in. (g) Delivered to job by truck, Boston. (h) F.o.b. job site via motor truck. (j) ¾ in stone. (k) Less 10c cash disc. (m) 2 in. and less. (n) Washed; 40c per ton dry. (p) Hard-head stone. (q) ¼ in. to 2½ in. (r) Crushed slag, ½ in., 90c–1.00; ¾ in., 50c–70c; 1½ in., 60c–70c; 2½ in., 60c–80c; rfg. slag, 1.00–1.50.

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Martinsville, Va.—Mine scrap, per ton, 16.00–20.00; mica schist, per ton	12.00
Franklin, N. C.	
Clean scrap, washed	20.00
Ground mica, per ton at mill, 20 mesh, 25.00; 40 mesh, 30.00; 60 mesh, 35.00; 100 mesh	50.00
Roofing mica, per ton at mill	25.00
Penland, N. C.—Mine scrap, per ton	10.00
Clean shop scrap, per ton	16.00
Roofing mica, per ton	20.00

Roofing Slag

Prices given are per ton f.o.b. city named, unless otherwise noted.

Bethlehem, Penn.	1.00–1.50‡
Birmingham, Ala.	2.05*
Buffalo, N. Y.	2.50†
Ensley and Gadsden, Ala.	2.05
Erie and Du Bois, Penn.	2.50†
Longdale, Va.	2.50
Toledo, Ohio	1.10

*Less 5c ton disc. for pay. 15th following month. †Price f.o.b. trucks at plant, subject to discount of 10c per ton for payment on or before the 15th of following month. ‡F.o.b. plant.

Agricultural Limestone

(Crushed)

Alco, Va. — Precipitated lime, 97% $CaCO_3$; 1% $MgCO_3$, bulk 2.25, in 125 lb. bags	3.75
Alton, Ill.—90% thru 100 mesh	4.00
Cartersville, Ga.—50% thru 100 mesh, per ton, 1.50; pulverized limestone	1.75
Colton, Calif.—Analysis, 95.97% $CaCO_3$; 1.31% $MgCO_3$ all thru 14 mesh down to powder	3.50
Davenport, Iowa — Analysis, 90-98% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 4 mesh; bulk	1.10
Dolomite, Calif.—Analysis, 54% $CaCO_3$; 45% $MgCO_3$; 99% thru 10 mesh, per ton, 2.10; 49% thru 60 mesh, ¼-in. to dust, per ton	1.70
Fort Spring, W. Va.—Analysis, 90% $CaCO_3$; 3% $MgCO_3$, 50% thru 100 mesh, per ton, 1.25; pulverized limestone, 80% thru 200 mesh	4.25
Gibsonburg, Ohio—Analysis, 55% $CaCO_3$; 43.40% $MgCO_3$; 50% thru 50 mesh, 1.25; pulverized, bulk, 3.00; in bags	4.50
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, pulverized, in bags, 4.50, bulk	3.00
Lannon, Wis.—50% thru 100 mesh	1.50
Marion, Va.—Analysis, $CaCO_3$, 90%; $MgCO_3$, trace; per ton, pulverized	2.00
Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh	4.25
Osborne, Penn. — Analysis, 94.89% $CaCO_3$, 1.50% $MgCO_3$; 100% thru 20 mesh; 60% thru 100 mesh and 45% thru 200 mesh, per ton, f.o.b. mine	3.50
Stone City, Ia.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Waukesha, Wis.—90% thru 100 mesh, 4.10; 50% thru 100 mesh, per ton	2.10

Pulverized Limestone for Coal Operators

Davenport, Ia.—Analysis, 90-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh: sacks, ton	6.00
Joliet, Ill.—Analysis, 48% $CaCO_3$; 42% $MgCO_3$; 90% thru 200 mesh (bags extra)	3.50
Waukesha, Wis.—90% thru 100 mesh	4.10

Chicken Grits

Chico, Tex.—(Limestone) packed in 100-lb. sacks, per cwt., f.o.b. cars at plant	1.00
Davenport, Iowa—High calcium carbonate limestone, in bags, L.C.L., per ton	6.00
Gibsonburg, Ohio—(Agstone)	10.00
Los Angeles, Calif.—(Gypsum), per ton, including sacks	7.50– 9.50
Marble grits, per ton, incl. sacks	10.00–12.50
Maplewood, Mo.—(Limestone), per ton	12.00
Middlebury, Vt.—Per ton (a)	10.00
Port Clinton, Ohio—(Gypsum), per ton	6.00
Randville, Mich.—(Marble), per ton, bulk	6.00
Saltville, Va.—(Gypsum) in 100-lb. jute sacks, per ton	12.00
Waukesha, Wis.—(Limestone), per ton (a) F.o.b. Middlebury, Vt.	7.00

Whiting

St. Louis, Mo., per ton	15.00*
Chicago, Ill., prices per ton.	
Domestic putty whiting	10.00–12.00
Domestic precipitated whiting	15.00–20.00
Imported bolted whiting	30.00–35.00
Philadelphia, Penn. — English chalk whiting packed in 50-lb. paper bags, per ton, in carloads	15.00

*Packed in bbl., f.o.b. St. Louis.

Portland Cement

	F.o.b. city named Per Bag	Per Bbl.	High Early Strength
Atlanta, Ga.	.....	†1.87	2.92¶
Boston, Mass.	.43½	1.74†	2.48¶
Birmingham, Ala.	.....	†1.56	2.61¶
Charleston, S. C.	.....	1.89†	2.94¶
Chicago, Ill.	.....	1.35†	2.11¶
Cincinnati, Ohio	.....	1.23†	2.09¶
Cleveland, Ohio	.....	.....	2.34¶
Columbus, Ohio	.....	.....	2.26¶
Dallas, Tex.	.....	1.76	.....
Dayton, Ohio	.....	.....	2.19¶
Houston, Tex.	.....	1.98	.....
Jackson, Miss.	.....	†1.94	2.99¶
Jacksonville, Fla.	.....	†1.96	3.01¶
Indianapolis, Ind.	.....	1.39†	2.04¶
Jersey City, N. J.	.....	1.59†	.....
Kansas City, Mo.	.31¾	1.27†	2.17¶
Louisville, Ky.	.....	1.41†	2.09¶
Memphis, Tenn.	.....	†1.73	2.78¶
Milwaukee, Wis.	.....	1.45†	2.20¶
Montreal, Que.	.....	1.66§	.....
New Orleans, La.	.....	1.86†	2.96¶
New York, N. Y.	.37½	1.49†	2.24¶
Omaha, Neb.	.34¾	1.39†	2.29¶
Portland, Ore.	.....	2.40	.....
Reno, Nev.	.....	2.76‡	.....
St. Louis, Mo.	.....	1.20†	2.09¶
San Francisco, Calif.	.....	2.04‡	.....
Savannah, Ga.	.....	1.89†	2.94¶
Seattle, Wash.	.....	2.20–2.45	2.50c
Tampa, Fla.	.....	2.00†	3.16¶
Topeka, Kan.	.37½	1.50†	2.46¶
Wheeling, W. Va.	.....	1.42†	.....

Mill prices f.o.b. in carload lots, without bags, to contractors.

Hudson, N. Y.	.....	*1.61–1.76‖	2.29‖
Lime & Oswego, Ore.	.....	2.40	.....
Limedale, Ind.	.....	1.10†	.....

NOTE: Unless otherwise noted, prices quoted are net prices, without charge for bags. Add 40c per bbl. for bags. †Includes 10c cash disc. ‡Subject to **2% discount payment 10th of month following invoice date. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c discount** 15 days. (c) Quick-hardening "Velo," packed in paper bags, 10c discount 10 days. §Sales tax included at 4%. *Cars mill. ‖Trucks mill.

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Eau Claire, Wis.	.....	.50
Ohlton, Ohio	1.50	1.50

Glass Sand

(Silica sand is quoted washed, dried and screened)

Klondike, Mo.	2.00
Ohlton, Ohio	2.40
Ottawa, Ill.	1.25
South Vineland, N. J.	1.50

Potash Feldspar

East Liverpool, Ohio—White; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.06%; Al_2O_3, 18%; pulverized, 98% thru 200 mesh, per ton, in bulk, 18.35; in bags 20.35

Penland, N. C.—Crude feldspar, bulk, per ton 6.25– 7.50

Spruce Pine, N. C.—(Chemically controlled.) Color, white; 200 mesh; analysis, K_2O, 11.30%; Na_2O, 2%; SiO_2, 67%; Fe_2O_3, 0.10%; Al_2O_3, 18.60%; per ton, in bulk 15.00

Topsham, Me.—White; analysis, K_2O, 9.00%; Na_2O, 2.75%; SiO_2, 71%; Fe_2O_3, 0.06%; Al_2O_3, 16.50%; pulverized, 98% thru 200 mesh; per ton in bulk, 17.50; in bags 18.70

West Paris, Me.—(Chemically controlled.) Color, white; 200 mesh; analysis, K_2O, 11.20%; Na_2O, 3.20%; SiO_2, 65.70%; Fe_2O_3, 0.09%; Al_2O_3, 19.20%; per ton, in bulk 19.00

Soda Feldspar

Spruce Pine, N. C.—(Chemically controlled.) Color, white; 200 mesh; analysis, K_2O, 5.50%; Na_2O, 5.50%; SiO_2, 68.80%; Fe_2O_3, 0.10%; Al_2O_3, 18.60%; per ton, in bulk 18.00

Masonry Cement

The prices shown here are for various brands of masonry and mortar cement, including cost of bags.

	Per bag	Per bbl.
Cincinnati, Ohio	†.38½	†1.54
Columbus, Ohio	†.40¼	†1.61
Dayton, Ohio	†.39	†1.56
Detroit, Mich.	†.41¾	†1.67
Indianapolis, Ind.	†.37½	†1.50
Louisville, Ky.	†.35½	†1.42
Memphis, Tenn.	†.43½	†1.74
Norfolk, Va.	†.49½	†1.98
St. Louis, Mo.	†.40¾	†1.63
Toledo, Ohio	†.41	†1.64
Winston-Salem, N. C.	†.46½	†1.86

†Packed in paper sacks; price includes cost of sacks, and is subject to 10c bbl. discount for payment in 15 days.

Rock Phosphate

Prices given are per ton (2240 lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Fernandina, Fla., B.P.L. 77/76%, per ton	6.50
Gordonsburg, Tenn.	4.25– 4.75
Mt. Pleasant, Tenn., B.P.L. 75%	5.75

Ground Rock (2000 lb.)

Gordonsburg, Tenn.	5.25– 6.00
Mt. Pleasant, Tenn.—(Lime phosphate) —B.P.L. 75%; per ton, bags extra	12.80
Ground rock, B.P.L. 72%, per ton	5.00– 5.50

Florida Phosphate (Raw Land Pebble)

Mulberry, Fla.—Gross ton, f.o.b. mines

68/66% B.P.L.	**3.15**
70% minimum B.P.L.	**3.75**
72% minimum B.P.L.	**4.25**
75/74% B.P.L.	**5.25**
77/76% B.P.L.	**6.25**

Stone-Tile Hollow Brick

Prices are net per thousand, f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	**40.00**	**60.00**	**70.00**
Altadena, Calif.	45.00	55.00	65.00
Asheville, N. C.	30.00	40.00	50.00
Atlanta, Ga.	**29.00**	**42.50**	**53.00**
Auburn, Wash.	.....	50.00	65.00
Brownsville, Tex.	.....	**53.00**	**62.50**
Brunswick, Me.	29.50	42.25	55.00
Chula Vista, Calif.	32.50	42.50	50.00
Daytona Beach, Fla.	45.00	55.00	65.00
Frostproof, Fla.	45.00	65.00	75.00
Houston, Tex.	36.00	53.00	66.00
Klamath Falls, Ore.	50.00	60.00	70.00
Longview, Wash.	.....	50.00	60.00
Los Angeles, Calif.	**29.00**	**39.00**	**45.00**
Macon, Ga.	25.00	35.00	45.00
Mattituck, N. Y.	**45.00**	**55.00**	**65.00**
Medford, Ore.	**50.00**	**55.00**	**70.00**
Memphis, Tenn.	45.00	50.00	60.00
Mineola, N. Y.	40.00	50.00	60.00
Nashville, Tenn.*	32.00	50.00	60.00
New Orleans, La.	45.00	55.00	65.00
Norfolk, Va.	33.00	46.00	60.00
Passaic, N. J.	**40.00**	**52.50**	**70.00**
Pawtucket, R. I.	27.50	41.25	55.00
Presidio, Tex.	55.00	65.00	75.00
Roanoke, Va.	32.50	40.00	50.00
Salem, Mass.	**40.00**	**60.00**	**75.00**
San Antonio, Tex.	**37.00**	**46.00**	**60.00**
San Diego, Calif.	**35.00**	**44.00**	**52.50**
Spartanburg, S. C.	32.50	40.00	52.50

Prices are for standard sizes—No. 4, size 3½x 4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. *Delivered on job. †10% discount.

Core and Foundry Sands

Silica sand quoted washed, dried, screened unless otherwise stated; lowest net prices per ton f.o.b. plant

City or shipping point	Molding: Fine	Molding: Coarse	Molding: Brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.00	.....	.....	3.50	.....
Eau Claire, Wis.	.....	.....	.....	.....	.....	2.00b	.....
Elco, Ill.	Amor. silica, 90-99½% thru 325 mesh,						$10.00
Montoursville, Penn.	.....	.....	.....	1.35a	.....	.....	.....
New Lexington, Ohio	2.00	1.25	.....	.....	.....	.....	.....
Ohlton, Ohio	1.50	1.50	.....	1.50	1.50	1.50	.....
Ottawa, Ill.	.....	.....	.....	.....	.....	3.50	.....

South Vineland, N. J.—Dry washed silica, 2.00 per ton.
(a) To 1.60. (b) To 2.50.

Wholesale Prices of Slate

Lowest prices f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened, 200 mesh, 6.00 per ton in paper bags

Roofing Slate

Prices per square—Standard thickness

City or shipping point	3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Bangor, Penn.—						
Gen. Bangor No. 1 clear	10.00	20.00	25.00	29.00	40.00	50.00
Gen. Bangor No. 1 ribbon	9.00	16.00	20.00	25.00	35.00	46.00
No. ? Albion	7.25	16.00	23.00	27.00	37.00	46.00
Gen. Bangor No. 2 ribbon	6.75	.....	.....	.....	.....	.....
Chapman Quarries, Penn.—						
No. 1 slate	.....	12.50	18.00	21.50	25.00	30.00
Hard vein	9.00–11.00	15.00	22.00	26.50	32.00	37.00
No. 2 slate	8.00– 9.00	.....	.....	.....	.....	.....
Pen Argyl, Penn.*						
Graduated slate	.....	16.00	23.00	27.00	37.00	46.00

Albion blue-grey roofing slate, No. 1 clear 7.25–10.50, mediums 8.00–9.00; No. 1 ribbon, 8.00–8.50.
*2% discount for payment 15 days from date of invoice.

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.

ROCK PRODUCTS solicits volunteers to furnish accurate price quotations.

Lime Products

(Lowest carload prices per ton f.o.b. shipping point unless otherwise noted)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Bulk	Ground burnt lime, Bags	Lump lime In bulk	Lump lime In bbl.
EASTERN:								
Berkeley, R. I.	.....	11.25	9.50	.....	.....	15.50	.....	19.25
Buffalo, N. Y.	7.00	5.50	5.50	11.00	6.00	8.00	6.00	.....
Cedar Hollow, Devault, Rambo and Swedeland, Penn.	.....	8.50c	8.50c	8.50c	7.00	8.50	8.50	.....
Lime Ridge, Penn.	.....	.....	8.00	.....	6.00	7.00	4.50	.....
CENTRAL:								
Cold Springs, Ohio§	.....	5.50	5.50	.....	.....	.....	6.00	.....
White Rock, Gibsonburg, Marblehead, Ohio, and Huntington, Ind.	7.00*	5.50	5.50	11.00	6.00	8.00	6.00	.....
Delaware, Ohio	7.00	5.50	5.50	6.50	5.50	.....	5.50	.....
Sheboygan, Wis.	.....	10.50	10.50	10.50	.....	13.50‡	9.50	20.00¶
Woodville, Ohio	7.00	5.50	5.50	9.00	6.00	8.00	6.00	14.00
SOUTHERN:								
Cartersville, Ga.	.....	8.00	5.50	.....	.....	.....	6.50	12.50
Eagle Mountain, Va.	.....	8.00	8.00	8.00	.....	8.00	6.50	.....
Keystone, Ala.	.....	8.00	8.00	7.50	.....	.....	6.50	12.50
Knoxville, Tenn.	.....	8.00	8.00	7.50	.....	.....	6.50	.....
WESTERN:								
Little Rock, Ark.	.....	12.40	.....	12.40	.....	.....	9.90	17.40
San Francisco, Cal. (b)	20.00	20.00	12.00	20.00	.....	.....	.....	.....
San Francisco, Calif.	§19.00	15.00	12.50	14.00	11.00	17.60†	11.00	17.60¶

(a) In 100-lb. bags. (b) Woodburnt lime: finishing hydrate, 20.00 per ton; pulv. lime, 2.00 per iron drum. Oil-burnt pulv. lime, 13.00–14.50 per ton. (c) In 50-lb. paper. (d) To 10.00. *At White Rock and Gibsonburg, Ohio. ¶In 200-lb. steel barrels. ‖Refund for return of barrels. †Refund for return of burlap bags. §To dealers and industrial concerns in carload lots. ‡Crushed burnt lime.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chester, Vt.—Finely ground talc (carloads), Grade A—99-99¼% thru 200 mesh, 8.00–8.50; Grade B, 97-98% thru 200 mesh 7.00– 7.50
1.00 per ton extra for 50-lb. paper bags; 166⅔-lb. burlap bags, 15c each; 200-lb. burlap bags, 18c each. Credit for return of burlap bags. Terms 1%, 10 days.

Emeryville, N. Y.:
Ground talc (200 mesh), bags 13.75
Ground talc (325 mesh), in bags 14.75

Henry, Va.:
Crude, bulk 3.25– 3.75
Ground talc (150-200 mesh), in bags.. 4.80– 8.00

Joliet, Ill.:
Ground talc, 200 mesh, in bags:
California talc 30.00
Southern talc 20.00
Illinois talc 10.00

Los Angeles, Calif.:
Ground talc (150 to 200 mesh), in bags 15.00–30.00

Natural Bridge, N. Y.:
Ground talc (300-325 mesh), in 50-lb., 100-lb. and 200-lb. bags, per ton.... 10.00–20.00

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream and coral pink	¶12.50–‖14.50	¶12.50–‖14.50
Cardiffe, Md.—Crushed green marble	12.50– 14.50	12.50– 14.50
Davenport, Iowa—High calcium carbonate limestone, in bags, ton	‖6.00	‖6.00
Los Angeles, Calif.—(a)		
White	¶11.00–‖13.50	¶11.00–‖13.50
Snowflake	.....	¶11.00–‖13.50
Golden, browns, grey, blues, blacks	¶16.00–‖18.50	¶16.00 ‖18.50
Dolomite, Calif. (Lone Pine)—(a)		
White	¶8.80– ‖8.80	¶8.80– ‖8.80
Snowflake	.....	¶8.80– ‖8.80
Golden, browns, grey, blues, blacks	¶13.80–‖13.80	¶13.80–‖13.80
Middlebrook, Mo.—Red	.....	20.00– 25.00
Middlebury, Vt.—White	.....	¶9.00–‖10.00
Randville, Mich.—Crystalite, crushed white marble, bulk	4.50	4.50– 5.00
Tuckahoe, N. Y.	¶5.00– ‖6.00	.....
Warren, N. H.	.....	‖8.00– 11.25

¶C.L. ‖L.C.L. *Per 100-lb. (a) Including bags.

Art and Cast Stone Aggregates

Cardiffe, Md.—Green marble fines in carloads; bulk, 7.50; in bags.... 10.00
Los Angeles, Calif.—Dolomite aggregates, all sizes and colors† ..... ¶10.00 ‖12.50
Dolomite special cast stone, wet-cast aggregate, white, ¼-in. to dust a5.30

† 100-lb. sacks. ¶C.L. ‖L.C.L. (a) In open cars.

Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points. Bags extra and returnable for full credit.

16– 30 mesh 20.00
30– 60 mesh 22.00
60–100 mesh 18.00
100 mesh and finer 9.00
Joliet, Ill.—All passing 100 mesh, f.o.b. Joliet, incl. cost of bags 24.00

Cement Building Tile

Lexington, Ky.:
5x8x12, per 1000 ..... 55.00
4x5x12, per 1000 ..... 35.00
New Castle, Penn:
Red, 9x15-in., per sq., 12.00; green, 9x15-in., per sq. 15.00

Wichita, Kan. (Duntile)	Plain	Glazed
8x8x12-in., each	.09	.13
6x8x12-in., each	.08	.13
6x6x12-in., each	.07	.12
4x5x12-in., each	.05	.08
4x4x12-in., each	.04	.07½
Uncolite tile: 4x8x16-in., each	.07	.12

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Cicero, Ill.—French and Spanish tile, 9x15-in., per sq. 9.50–12.00
Closed end shingle, 8½x12½ in., per sq. 11.00–13.00
New York City, N. Y., per sq. 10.00

Cement Drain Tile

Grand Rapids and Saginaw, Mich.—Price per 1000 ft. in carload lots.

4-in.	42.00	15-in.	341.25
5-in.	52.50	18-in.	472.50
6-in.	78.75	20-in.	630.00
8-in.	115.50	22-in.	787.50
10-in.	173.25	24-in.	892.50
12-in.	199.50		

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

Camden, N. J.: 8x8x16, each ..... .17b
Lexington, Ky.:
8x8x16 ..... ‡18.00*
8x8x16 ..... †16.00*
Omaha, Neb. (Prices f.o.b. plant)
8x 8x16, each 0.09
8x12x16, each ..... .11½
8x 4x16, each ..... .06
8x 3x16, each ..... .06
8x 6x16, each ..... .08
Wichita, Kan.: (c)
8x8x16, each 0.08–0.09a

*Price per 100 at plant.
†Rock or panel face.
‡Face. §Plain. (a) Rock face. (b) Less 10%.
(c) For glazed blocks add .05 each.

Concrete Brick

Prices given per 1000 brick, f.o.b. plant.

	Common	Face
Milwaukee, Wis.	14.00	15.00–.42.00
Omaha, Neb.	15.00	.....
Prairie du Chien, Wis.	12.00	20.00– 22.50
Rapid City, S. D.	16.00	30.00

Consider White Cement Plant in Texas

MAYOR C. D. LITTLE of Pelly, Tex., chairman of the committee appointed by Tri-Cities business men to investigate the proposition of bringing to the Tri-Cities a branch of the National Portland Cement Co., announced that the committee will report soon.

Other members of the committee are J. D. Dowell, vice-president of the Citizens State Bank and Trust Co., and H. E. Brunson, Baytown business man and president of the chamber of commerce of that city.

In the event the plant is established in the Tri-Cities, it is expected that rubble, a combination of marble and feldspar, will be shipped by water from the Pacific coast to be refined in the Tri-Cities reduction plant.

It would manufacture white cement exclusively at first, and later, officials said, production of gray cement might be included in the output.

The plant would serve all of the southern states and would centralize West Indies distribution in Cuba.—*Houston* (Tex.) *Post-Dispatch.*

Concrete Manual

THE Concrete Engineer's Manual has been issued by the International Correspondence Schools, Scranton, Penn. This manual is a reference book dealing with the fundamental principles of mathematics and mechanics of materials with which concrete engineers are interested.

This book offers an explanation of modern methods used in proportioning concrete mixtures, producing and placing concrete and providing waterproofing. The several types of reinforcement in use are described along with the details of various concrete structures. The manual contains detailed information concerning the design of slabs, beams, columns, foundation and retaining walls. It also has many valuable tables useful as a source of reference.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4-in.	6-in.	8-in.	10-in.	12-in.	15-in.	18-in.	20-in.	22-in.	24-in.	27-in.	30-in.	36-in.	42-in.	48-in.	54-in.	60-in.
Grand Rapids, Mich.																	
Culvert (d)	.....	.....	.....	.57	.67	.93	1.20	1.45e	.....	1.80	2.10	2.45	3.30	4.00	5.10	6.00	7.45
Sewer (c)	.....	.....	.....	.25	.32	.50	.82	.99e	1.32	1.48	2.14	2.37	.....	.....	.....	.....	.....
Wahoo, Neb.	12-in., 15-in., 18-in., 24-in., and from 30-in. to 60-in. pipe, per ton, 10.00																

(a) Reinforced. (c) To dealers. (d) To contractors. (e) 21-in. pipe.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

City or shipping point	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
East St. Louis, Ill.—Special Gypsum Products—Partition section, 4 in. thick, 12 in. wide, and up to 10 ft. 3 in. long, 12c per ft., 21.00 per ton; outside wall section and interior bearing wall section, 6 in. wide, 6 in. thick, and up to 10 ft. 3 in. long, 25c per ft., 30.00 per ton; floor section, 7 in. thick, 16 in. wide, and up to 13 ft. 6 in. long, 17c per ft., 23.00 per ton.													
Los Angeles, Calif.	.....	16.00*	10.00*	16.00	17.00	.....	14.00†	.....	27.00‡	16.00	19.00a	21.00	.....
Medicine Lodge, Kan.	1.40	.....	.....	.....	.....	.....	11.50b	.....	16.00b	.....	.....	.....	.....
Port Clinton, Ohio	4.00	6.00–8.00	6.00–8.00	10.00m	10.00n	10.00n	20.00k	8.00–11.00	24.50f	26.00g	15.00h	15.00h	27.00j
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00c	33.00d

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) Plasterboard, ⅜x32x36 in. (b) Includes paper bags. (c) Includes jute sacks. (d) "Gyproc," ⅜x48-in. by 5 and 10 ft. long. (f) To 27.50. (g) To 29.00. (h) To 16.00. (j) To 28.00. (k) To 23.00. (m) To 12.00. (n) To 13.00. *To 20.00. †To 17.00. ‡To 38.00.

News of All the Industry

Incorporations

Wentzville Stone and Quarry Co., Wentzville, Mo. Frank G. Arnote.

Universal-Atlas Cement Co., Chicago, Ill. Indiana capital increased from $72,747 to $76,775.

Worden Sand and Gravel Co., Bedford Hills, N. Y., 300 shares common.

Barber Asphalt Co., Philadelphia, Penn., $10,000,000, incorporated in Texas. Agent, I. D. White, Austin, Tex.

Erin Lime and Stone Co., Erin, Tenn., $10,000. Charles F. Lovell, G. W. Burgess and T. H. Warren.

Hillside Fluorspar Mines, 38 S. Dearborn St., Chicago, Ill., increased capital stock from 2000 shares of no par value to 4000 shares of no par value.

Rock County Sand and Gravel Co., Milwaukee, Wis., $75,000, consisting of 750 shares of $100 par value. Frank B. Schultz, president, Charles F. Schendel and Theodore C. Froemming, all of Milwaukee, and Otto J. Krueger, Wauwatosa, Wis.

Crystal Springs Sand and Gravel Co., Crystal Springs, Miss., $50,000. A. J. Lovelace, Brewton, Ala.; Dr. N. J. Milstead, Jackson, Ala.; G. L. Smith, Montgomery, Ala., and E. J. Traxler, Crystal Springs, Miss.

Federal Materials Co., Baltimore Trust Bldg., Baltimore, Md., incorporated in Kentucky. John M. Butler, Continental Bldg., Baltimore, Md., and A. J. Hoffman, Brown Hotel, Louisville, Ky. To mine limestone in Kentucky and Missouri.

Union Curb Co., Salisbury, N. C., 1000 shares common of no par value. Alexander Harvey, William Bennie of Point Peter, Ga., and P. A. Wellenborn of Salisbury, N. C. To quarry granite, stone and other minerals.

Quarries

Cynthiana, Ky. The fiscal court has authorized purchase of land for a rock quarry.

L. W. Hayes, Bethany, Mo., has purchased seven lots near his present quarry to provide for future requirements.

Raymond Contracting Co. lost its stone crusher in a fire near Bowling Green, Ky., recently. The fire was caused by an explosion.

O. T. Haase, Detroit, Mich., has announced plans to rehabilitate an old sandstone quarry near Ionia, Mich.

Piru, Calif. Electric lights have been installed at the local rock crushing plant to permit operation of two 10-hr. shifts at the plant.

Bluefield, W. Va. Stone for county road construction and maintenance is being prepared at Montcalm by the county court with a county-owned crusher.

Waukesha Lime and Stone Co., Waukesha, Wis., expected to dislodge 400,000 tons of limestone in a blast at its quarry recently. Dynamite was supplied by the Illinois Powder Manufacturing Co.

Lancaster, Wis. The city has opened its rock quarry to provide employment for local labor. Two shifts are being operated. The crushed rock will be used on Lancaster streets.

Ohio Crushed Stone Association is conducting a campaign for the improvement and construction of "food" roads. This name has been adopted because they serve the farmer in marketing crops.

W. P. Stoker, Kansas City, Kan., has leased an asphalt quarry in Pleasanton, Kan. The location for his crushing plant has been arranged and necessary equipment for the plant and quarries has been ordered.

Moulding-Brownell Corp., Chicago, Ill., has been awarded contract for materials on the new post-office building in Chicago. This order includes 75,000 cu. yd. of crushed stone, 50,000 cu. yd. of torpedo sand and 100,000 bbl. of cement.

Marble Cliff Quarries Co., Columbus, Ohio, recently obtained a publicity story in the Columbus State Journal on the uses of lime in agriculture. The item also explained five types of product for such use prepared by this company.

Lake Shore Sand and Stone Co., Milwaukee, Wis., has had publicity stories in a number of Wisconsin newspapers that tell the need of Wisconsin soils for lime. The article also speaks of other products it produces.

Carbon Limestone Co., Youngstown, Ohio, has obtained several newspaper publicity stories, chiefly regarding its agricultural limestone products and the service it renders in delivering these products to the farmer.

J. T. Degman has leased from the county the rock quarry near Hanford, Calif. One cent a ton royalty on all rock quarried will make up the rental to be paid the county, provided that the amount totals $50 per month. A minimum charge of $50 per month is to be paid.

Milwaukee, Wis. Residents of Wauwatosa have objected to the blast at the Francey stone quarry there. They claim the blasts used rock nearby homes and that a bluff has been created in quarrying which endangers traffic. A hearing of these claims was held before the board of public works, which is to report its findings to the city council.

Oskaloosa, Ia. The rock crusher purchased by the Mahaska county board of supervisors last spring will soon see its first active duty. Negotiations have been completed for a location. The county will pay 10 c. a ton or cu. yd. for all rock removed. Contract has been awarded for stripping the rock.

Sand and Gravel

Spy Run Sand and Gravel Corp., Ft. Wayne, Ind., has moved its main office to 2416 Cass St.

Correctionville, Ia. The gravel pit near here is being opened and will soon be in full operation.

Becker County Sand and Gravel Co., Ashby, Minn., is making repairs to its plant after several months of day and night operation.

Wissota Sand and Gravel Co., Eau Claire, Wis., is opening a new gravel pit and has added necessary equipment.

Western Sand and Gravel Co. recently suffered loss from a fire at its pit near Orestes, Ind. Production was temporarily delayed.

Peck Gravel Pit near Horatio, Ark., has added an extra force to take care of its increased business.

Albany Gravel Co., Albany, N. Y., was given a story in a local paper recently because of a spring which it maintains for passers-by.

Junction City, Kan. For the past several weeks a crew has been moving sand plant equipment up the river to a new location. A number of improvements will be made to the plant during the winter.

E. R. Webster of the Buckeye Sand and Gravel Co., McConnelsville, Ohio, has purchased property to use for storing gravel. Conveying equipment has been installed for unloading barges.

Mt. Morris, N. Y. An exceptional deposit of natural washed sand has been uncovered near here. The state has given consent to use this sand on various construction projects.

Nugent Sand Co., Louisville, Ky., suffered fire damage to its barges and equipment, estimated by T. C. L. Nugent, secretary-treasurer of the company, at $5000. The fire was reported to have started from floating oil or grease on the Ohio river.

Milwaukee, Wis. An investigation has been opened by the securities division of the public service commission to determine whether $75,000 worth of stock in the Ozaukee Sand and Gravel Co. was sold in Wisconsin without a securities permit. Persons alleged to have sold the stock have not yet been located.

Huntington Sand and Gravel Co. is moving its operation on the Ohio river. Sand and gravel taken from its former operation was recently condemned by state highway officials because it did not meet specifications. The company has moved its dredges to another point, hoping the new location will provide suitable sand.

Cement

Great Lakes Portland Cement Corp., Buffalo, N. Y., has resumed operations at its plant.

Alpha Portland Cement Co. has resumed operation at its Ironton, Ohio, plant.

Cowell Portland Cement Co., San Francisco, Calif., resumed operations at its plant at Cowell September 1.

Marquette Cement Manufacturing Co., Chicago, Ill., has been given a contract by the Molding-Brownell Corp. for 300,000 bbl. of cement to be used in the new postoffice and Field buildings in Chicago.

Utah-Idaho Cement Co. plant at Brigham City, Utah, recently was damaged by fire. The stock house and finishing grinding department were burned. Company officials said the plant would continue to run on a part-time basis until repairs and rebuilding were completed. Arrangements have been made to fill all orders.

Kosmos Portland Cement Co., Kosmosdale, Ky., has mailed the September issue of "The Kosmos Cement News." This interesting 8-page publication contains a great deal of news on construction projects in its territory. Of particular interest is a story on the ready-mixed concrete operations of the Cincinnati Builders Supply Co.

Cement Products

Ideal Sand and Gravel Co., Mason City, Ia., had a small amount of damage as the result of a fire at its cement block plant.

Ready-Mixed Concrete Corp., Indianapolis, Ind., has been given a number of publicity stories in local papers which describe its operation.

Permanent Burial Vault Co., Miamisburg, Ohio, has been promoting the use of its concrete vaults through news stories in Ohio papers.

George B. Hudock, Freeland, Penn., had a fire in his cement block plant September 12. Loss was reported as $10,000.

B. F. Harris, Independence, Ia., had a fire in building for manufacturing cement blocks. Loss of $3000 is reported.

Reed City, Mich. A plant for the manufacture of cement blocks has been established by the county here. The blocks are to be used in building a state garage to require 5500 blocks.

Gypsum

Westmoreland, Calif. The local chamber of commerce is working on the construction of a road to the gypsum mine near Borego Valley and the securing of an industrial site for shipping gypsum to coast markets. It is reported that W. N. Kenyon is promoting this project.

Lime

Kelley Island Lime and Transport Co., Cleveland, Ohio, had an exhibit of its various products on display at the Lake County, Ohio, fair. Much interest was shown in the exhibit.

Miscellaneous Rock Products

Clifton, Tex. A kaolin plant is being constructed near Gonzales by a California company.

H. D. Barndollar and **W. L. Kepner** of Joplin, Mo., are building a rock asphalt plant at Ellis, Mo. The cost is reported as $100,000.

DuVal Engineering and Contracting Co., Jacksonville, Fla., is erecting a modern oyster shell crushing plant near Williston, Fla.

Pacific Phosphate and Chemical Co. plans construction of a new plant in Portland, Ore., to cost $25,000, according to Allan Swain, president.

Roquemore Gravel Co., Montgomery, Ala., is building a crushing and screening plant for slag at Bessemer to have a capacity of 50 cars per day. Operation will start in September.

Milan, Italy. The Italian government has put a duty of 550 lire on 1000 kilograms of nitrate of soda. Formerly this same duty was levied on 1,000,000 kilograms.

Ross-Republic Marble Co., Knoxville, Tenn., has filed a petition claiming a cash deposit of $30,343 when it went into receivership. It asked that it be given judgment for that amount.

Royal Marble Co., Knoxville, Tenn., will be sold to satisfy claims unless it pays them, Chancellor Jones of the Third District Court has ordered.

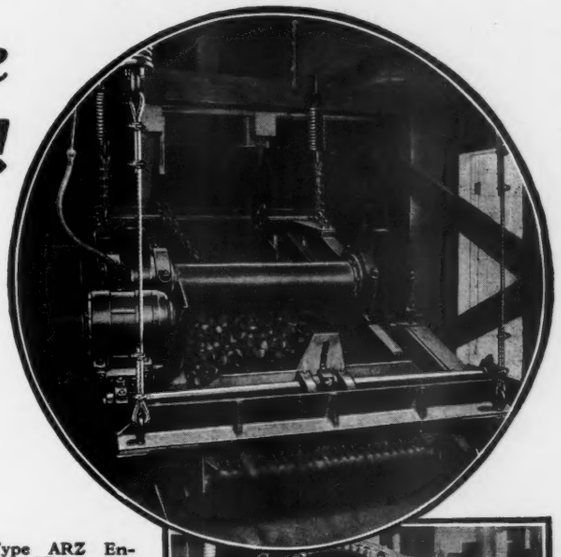
D. H. Marlow, reported as representing Philadelphia capitalists, is said to be planning the development of barium sulphate near Fredericksburg, Tex. They will install equipment and later may erect a refining plant.

Consolidated Mining and Smelting Co., Ltd.,

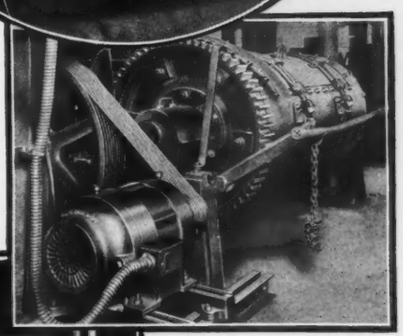
Ask Your Maintenance Man!

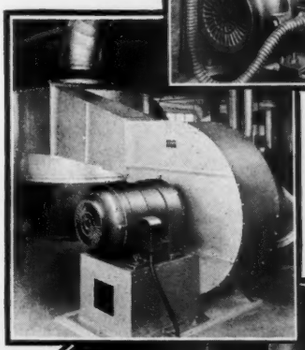
..where the troublesome drives in your plant are!

Ask him where dust, dirt, moisture, dripping water, or even destructive gases are present. Those drives in out-of-the-way places, where motor windings become clogged or moisture soaked.... Ask him to study the Allis-Chalmers Enclosed Fan-cooled Motors, approved by the Underwriters for dusty locations, and where explosive gases are present.... Ask him to notice how these motors have the same sturdy construction, liberal design, and unexcelled insulation, that for years have been characteristic of Allis-Chalmers motors.... Ask him to note also, how these enclosed fan-cooled motors are as easily accessible, and with no greater number of parts, than a standard open motor.... Ask him to write for Leaflet 2124, on the Enclosed Fan-cooled Motor, and Leaflet 2125A, on the Explosion-proof Motor.

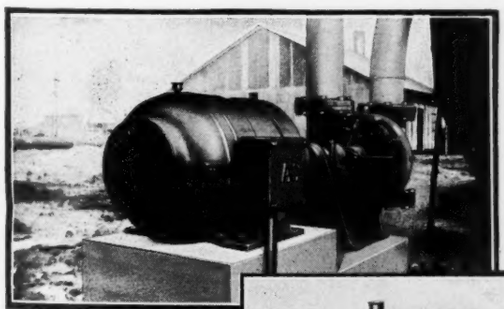


Type ARZ Enclosed Fan-cooled Motors are used on all Allis-Chalmers Centrifugal Vibrating Screens because these motors are best protected against dust, dirt and water.



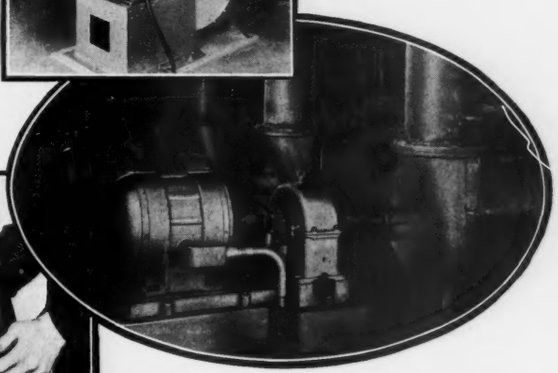


Even in a foundry atmosphere laden with iron dust and fine sand, type ARZ Motors operate without trouble. This motor operates a tumbling barrel for cleaning small iron castings.

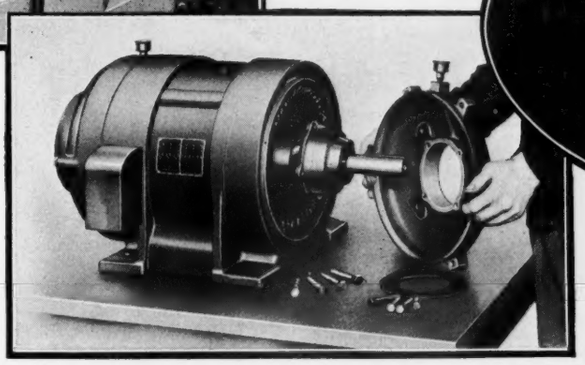


Right — ARZ motor driving fan in a starch mill where fine dust is always present and enclosed motors are necessary for safety of operation.

Left—Type ARZZ Explosion Proof Motor driving gasoline pump in Texas refinery. This motor saved the cost of a building and fire wall.



ARZ Motors driving rotary stock screens in a southern paper mill. This mill uses 15,000 h.p. of Allis-Chalmers motors, many of them enclosed as protection against gases, acids and water.



Allis-Chalmers Enclosed Fan - Cooled Motors are as readily accessible as those of the open type.

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Allis-Chalmers Manufacturing Company, Milwaukee

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Trail, B. C., was described in an interesting and detailed story of its operations at Trail in a recent issue of the "Vancouver Evening Sun." The manufacturing processes used and products produced were described.

Personals

Alton J. Blank, Compania de Cemento Portland "Landa," S.A., Puebla, Mexico, has spent the past two weeks visiting his parents in Ironton, Ohio.

Genereoso Pope, president of the Colonial Sand and Gravel Co., Flushing, N. Y., has purchased "Corriere d'America," an Italian newspaper, it was recently announced. This is the third Italian newspaper taken over by Mr. Pope.

Joseph B. McCracken has been appointed sales manager of the Keystone Portland Cement Co., Philadelphia, Penn. Mr. McCracken was formerly connected with the Atlas Portland Cement Co. in New York and Chicago.

Joe Johnson, engineer at the Lutesville Sand and Gravel Co. pit at Colfax, La., was recently injured in an accident at the pit. On the way to the doctor the car in which he was riding collided with another and caused further injuries. Mr. Johnson is reported as improving.

Jack Conway has been appointed sales manager of the H. O. Penn Machinery Co., New York City, distributors of the Byers Machine Co. products. Mr. Conway was formerly connected as sales manager of the Complete Machinery Co., New York; Hunter Machinery Co., Pittsburgh, and the Leach Mixer Co.

W. E. Barker, highway engineer, Portland Cement Association, is to address the weekly meeting of the Western Society of Engineers, Chicago, Ill., on "Design of Concrete Pavements" September 29.

H. K. Hill, former vice-president of the Columbus Builders' Supply Co., is now a member of the sales force of the Columbus Coal and Lime Co., Columbus, Ohio.

Edward L. Ryerson, Jr., president of Joseph T. Ryerson and Son, Inc., Chicago, Ill., has been appointed by President Hoover as one of a committee of 60 leaders to assist Walter S. Gifford in the nation's relief program. Mr. Ryerson, Jr., is also chairman of the governor's commission on unemployment and relief for the state of Illinois. In addition to the governor's state commission there is also a local county organization of which Mr. Ryerson, Jr., is president.

E. L. Ryerson, Jr.

Roscoe Seybold has been appointed comptroller of the Westinghouse Electric and Manufacturing Co., Pittsburgh, Penn. Mr. Seybold, who advances to the position of comptroller from the post of assistant to the president, has been continuously in the service of the Westinghouse company for 24 years.

Obituaries

Tom Grice, 30, was killed in a crusher at the Stone Mountain granite quarries, Atlanta, Ga., on September 15.

Robert Price, 16, was fatally injured recently when a rock weighing more than a ton fell on him while he was scraping down gravel in a pit near Fort Worth, Tex.

T. E. Saunders, 59, president of the T. E. Saunders Co., concrete block manufacturers, Campbellsville, Ky., died September 11 from a heart attack while at work.

Ralph J. Jones was killed in an accident at the Pennsylvania-Dixie Cement Co. plant at Clinchfield, Ga., recently. The accident was caused by a slide in the quarry which entrapped him in the steam shovel.

Robert S. Simms, 40, Southgate, Ky., president of the Iron Clad Concrete Block Co., Newport, Ky., died September 14, following an operation. He was born and reared in Newport but had resided in Southgate for the past three years.

Forrest S. Hatfield, office manager of the Wolf River Sand and Gravel Co., Memphis, Tenn., died at his home September 15. He had been employed by the Wolf River company for the past nine years.

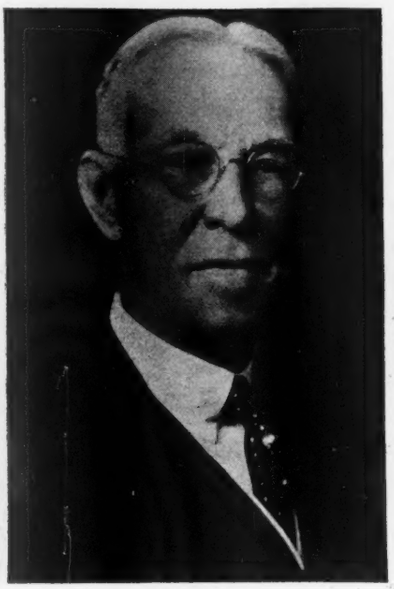
James H. Wood, 54, died September 7 in Windsor, Ont. Mr. Wood was a native of Lockport, N. Y. For the last six years he had been sales manager of the Plaster Products Co., Windsor, Ont.

Anthony T. Farrell, 55, St. Paul, Minn., salesman for the Pioneer Gravel Equipment Manufacturing Co., Minneapolis, Minn., was killed recently in an altercation with a highway laborer near Riverton, Wyo. It is reported the worker was held on a murder charge.

A. D. Quinn, sales manager of the Industrial Division of the L. H. Gilmer Co., Philadelphia, died suddenly September 17 in Chicago, Ill. Mr. Quinn had been associated with the Gilmer company since 1919 and had been closely associated with the promotion of the Gilmer V-Belt.

Mortimer B. Fuller, 54, president of the International Salt Co., died at his home at Dalton, Penn., September 8. He succeeded his father as head of the salt compnyy in 1909. He was also president of the Empire Limestone Co. of Buffalo, as well as of a number of other organizations.

Dr. Harry Phillips Davis, vice-president and director of the Westinghouse Electric and Manufacturing Co. and chairman of the National Broadcasting Co., died at his home in Pittsburgh, Penn., September 10. He had been ill for several months following an operation. Dr. Davis had complete



Dr. H. P. Davis

charge of the company's government contracts for munitions during the World War and had been very active in the company's work for 40 years. Dr. Davis was a graduate of Worcester Polytechnic Institute with the degree of bachelor of science in engineering. After a tour of Europe he joined the Westinghouse company, with which he had been associated since.

Manufacturers

General Electric Co., Schenectady, N. Y., announces the opening at Schenectady of a school of welding design and methods of designing welded buildings.

Gardner-Denver Co., Quincy, Ill., announces the appointment of the Interstate Machinery and Supply Co., Omaha, Neb., as its representative in that territory. A stock of products will be carried in Omaha.

Sullivan Machinery Co., Chicago, Ill., announces the appointment of Leon J. Cone as district manager at Duluth. Mr. Cone succeeds Jonathan A. Noyes, who has been promoted to manager of the company's coal machinery sales division with headquarters in Chicago.

Pennsylvania Pump and Compressor Co., Easton, Penn., announces its association with the Byer Engineering Associates of Easton. The Byer associates specialize in direct contact condensing and cooling apparatus, barometric and low level jet condensers and other power accessories.

American Rolling Mill Co., Middletown, Ohio, announces it has arranged to "return to the air" during the coming winter. Arrangements have been made to broadcast over a national chain system and also on two short wave length stations to reach foreign countries. The first program, which will be featured by a talk by George M. Verity, chairman of the board, will be October 19, between 9 and 9:30, eastern standard time.

Link-Belt Co. and H. W. Caldwell and Son Co., Chicago, Ill., held their annual golf tournament at Cog-Hill course near Chicago, September 12. More than 100 took part in this Blind Bogey tourney. Among the executives who participated were W. C. Carter and J. C. Nellegar, vice-presidents; R. W. Yerkes, secretary and treasurer; J. S. Holl, advertising manager; W. W. Sayers, chief engineer; E. J. Burnell, sales manager; and Charles Piez, chairman of the board, was judge. The tournament was a decided success and will be repeated next spring.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention Rock Products.

Nickel Cast Iron. "Nickel Cast Iron News" gives recent developments in the application of nickel cast iron in many products. INTERNATIONAL NICKEL CO., INC., New York, N. Y.

Wire Screen. "Through the Meshes" contains many pertinent remarks on general subjects. Some information is contained on wire screens. W. S. TYLER CO., Cleveland, Ohio.

Drill Steel Sharpener. Folder gives specifications and details of construction of the new DS-2 Gardner-Denver sharpener for drill steel used in hand drills. GARDNER-DENVER CO., Quincy, Ill.

Industrial Lubrication. Bulletin shows layout of Alemite pipe system for industrial plant for lubrication from central high pressure unit. ALEMITE CORP., Chicago, Ill.

Power Shovels. "The Ground-Hog" describes rock products operations and construction projects where the Marion shovel is in use. Many illustrations are shown. MARION STEAM SHOVEL CO., Marion, Ohio.

Potentiometer Pyrometer. Two-page circular features new line of potentiometer pyrometers. The circular illustrates six features of the instrument. BROWN INSTRUMENT CO., Philadelphia, Penn.

Return Bend Economizers Publication gives all the details of a steel return bend type economizer. Typical installation views and setting plans are shown. BABCOCK AND WILCOX CO., New York, N. Y.

Protective Coating. Folder describes "Liquilox," a product manufactured from ore which is said to be resistant to acids, heats, fires, alkalies, salts and waters. LIQUILOX CO., LTD., Los Angeles, Calif.

Woven Wire Screens. Folder gives specifications for complete range or sizes and other specifications of double-crimp and arch-crimp "Spring Steel" screens. THE LUDLOW-SAYLOR WIRE CO., St. Louis, Mo.

Special Steel. "Amsco Bulletin" for September describes the use of the Amsco dredge pump by the Pioneer Sand Co., and various other jobs on which this special steel is being used. AMERICAN MANGANESE STEEL CO., Chicago Heights, Ill.

Drag Scraper. The August-September issue of "Sauerman News" describes many interesting operations where drag scrapers are employed. Various equipment used in conjunction with these scrapers is illustrated. SAUERMAN BROS., INC., Chicago, Ill.

Electric Shovel-Dragline-Crane-Clamshell. Bulletin illustrates and describes the new 42-B 1½-yd. electric shovel-dragline-crane-clamshell. Working ranges and specifications are conveniently arranged for ready reference of the reader. BUCYRUS-ERIE CO., South Milwaukee, Wis.

Dust Collector. Illustrated bulletin describes the construction and operation of the "Vorticose" dust collector. Many applications of the equipment are listed and installations in carious industries are shown. DUST RECOVERY, INC., New York, N. Y.

Dryers. Bulletin 69 describes and illustrates Bartlett-Snow's 11 styles of dryers, giving details of their applications in various operations.. Other data useful to those interested in drying are included. C. O. BARTLETT AND SNOW CO., Cleveland, Ohio.

Spiral Welded Pipe Bulletin describes manufacture and gives engineering data and tables on "Armco" spiral welded pipe. Suggested specifications are included and typical installations are shown. AMERICAN ROLLING MILL CO., Middletown, Ohio.

Control Equipment. GES-699 describes the operation and application of the G-E Thrustor which exerts a smooth, powerful thrust and provides for cushioned return; **GEA-67B** describes CR 2931 float switches for use with automatic pumping equipment for water-level control; **GEA-1420** gives condensed data on time measuring equipment; **GEA-1435** is a specification sheet of G-E blast gates for low-pressure air and gas systems; **GEA-1184A** contains details of CR7006-D30B magnetic switch, across-the-line starter for induction motors; **GEA-1427** describes in detail applications, and gives specifications of the general-purpose automatic time switch. GENERAL ELECTRIC CO., Schenectady, N. Y.

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